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No. 119



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USSR REPORT  
BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 119

This serial publication contains articles, abstracts of articles and news items from USSR scientific and technical journals on the specific subjects reflected in the table of contents.

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NUTRITIONAL VALUE OF JAPANESE QUAIL IN SPACE LIFE-SUPPORT SYSTEMS

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 p 65

[Abstract of article: "The Prospects for Using Japanese Quail in Biological Life-Support Systems" by Ye. Shepelov, N. Agadzhanian, V. Mishchenko, V. Pofanov, KOSMICHESKAYA BIOLOGIYA I AVIAKOSMICHESKAYA MEDITSINA" No 1, 1979]

[Text] Scientists have concluded that it is necessary to build a life support system based on the recirculation of substances aboard space craft that remain in prolonged flight. Efforts are now underway to develop closed ecological systems based on physical-chemical as well as biological processes.

Of late, the attention of researchers has been drawn to a small bird--the Japanese quail. This species is characterized by a rapid succession of generations and in addition they also have a high rate of egg production. The adult male (at the age of 90 days) weighs 100 grams while the female weighs 150 grams. Over the course of a year, a female lays up to 300 eggs weighing up to a total of 3 kilograms. This is 20 times more than the live weight of the female herself (we note that a hen lays eggs with a total weight only 8 times greater than her own in the course of a year).

In order to compare how "profitable" this or that animal might be in the context of the closed ecological system of a space craft, an index of transformation has been introduced. This index shows what percentage of the energy expenditures for animal food is, in turn, useful to man in the form of nutrition. It appears that when rabbit flesh is consumed, only 6 percent of the energy expenditure is returned to man. From this point of view, the meat of broiler-fryers is nearly twice as good while the consumption of chicken eggs reproduces more than 20 percent of the energy expended. With modern industrial breeding it is possible to obtain 150,000 quail eggs per year, or 1.5 tons of egg weight, from 1 cubic meter of cells. Quail eggs and meat are not inferior to those of chickens in their taste properties.

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## AEROSPACE MEDICINE

### 'SOYUZ-32--SALYUT-6' ACTIVITIES DESCRIBED

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 p 111

[Article by Vladimir Gubarev: "The Seventh Crew of the Station 'Salyut-6'"]

[Text] The season for this year's manned space flights began on 25 February at 1554 hours Moscow time when the manned craft "Soyuz-32" was launched from Baykonur. Its crew: Lt Col Vladimir Afanas'yevich Lyakhov (flight commander) and Pilot-Cosmonaut Valeriy Viktorovich Ryumin (flight engineer; he made his first flight in October 1977 on the "Soyuz-25" craft).

Approximately 24 hours later on 26 February "Soyuz-32" had docked with the "Salyut-6" station which was flying in the automatic mode since 2 November 1978. The station was put into orbit in September 1977, and the two longest expeditions in the history of space flight took place aboard it with durations of 96 days (Yuriy Romanenko, Georgiy Grechko) and 140 days (Vladimir Kovalenok, Aleksandr Ivanchenkov). International crews which included cosmonauts from Czechoslovakia, Poland and the GDR lived at the station, while four unmanned "Progress" transport craft delivering fuel, equipment and expendables to the "Salyut-6" supported the prolonged active functioning of the station and the space complexes set up with it as a base.

The crew of the "Salyut-6"--"Soyuz-32" complex temporarily shut down the flight systems of the transport craft and reactivated the life support and power supply systems of the station itself. A careful inspection was made of the station and the volume of necessary preventive maintenance and repair operations on it was determined. By 28 February a permanent schedule of cosmonaut work had been established--the work day was from 0800 to 2300 hours Moscow time. While continuing to carry out the work to reactivate and control the station's systems, the cosmonauts started on a program of scientific experiments.

During the second half of the day on 1 March a correction was made in the flight trajectory of the complex: it was shifted into a near-circular orbit with an apogee of 338 km and a perigee of 308 km. The correction was accomplished by means of the propulsion system of the "Soyuz-32" craft.

On March 14 after nearly 2 days of flight independent of the station, "Salyut-6" docked (from the side of the service module) with the automatic transport craft "Progress-5." Besides the standard cargoes--fuel, materials to support the vital functions of the crew and the conduct of scientific experiments, mail--the station also received parts and units for preventive maintenance and repair operations.

The cosmonauts switched new chemical sources of current into the power supply system, installed the new "Kristall" electric heating unit, the "Kol'tso" system of internal communications, the "Yelena" gamma-telescope and embarked on major preventive maintenance operations on the station's propulsion system. The first system of television communications in the history of space flight "Zemlya--Orbita" began to function.

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## AGROTECHNOLOGY

### LIVESTOCK BREEDING--INDUSTRIAL VITAMIN PRODUCTION

Moscow IZVESTIYA in Russian 14 Jul 79 p 2

[Article by A. Solodukhin, director of the Krasnodarsk Biochemical and Vitamin Preparation Combine: "An Industrial Field"]

[Text] The rapid process of industrialization of livestock breeding has radically changed the concept of this industry. As compared with previous forms of farm management in industrial complexes, labor productivity has risen several-fold, the consumption of fodders per unit of output has been considerably reduced and the productivity of the animals and poultry has increased. The weak spots in today's livestock breeding, however, have now become obvious, and they perceptibly reduce the industry's efficiency.

Just how is this shown? It is, of course, possible to perfect the industry for construction of complexes and output of equipment for them. Just what, though, can be done with evolution, which has not prepared the animals for the technological revolution? Let us begin with the fact that, under the conditions of completely new technology, let us say, young bulls delivered for maturation and fattening are deprived of the opportunity to graze in meadows. While formerly, they themselves sought sources of vitamin feeding, now their rations should contain fodder enriched with vitamin additives.

It has been proven by science and advanced practical work that fodder protein, fats and carbohydrates are assimilated by the organism only when unique catalyzers are used--vitamins and other biologically active substances. If there are few vitamins in the fodders, then, for example, expensive and scarce fodder protein is only one-fourth assimilated. This is wastefulness.

Here is just one example. At the leading farms in the Kuban region, due to balancing the fodders and, primarily, their vitaminization, three to four fodder units are expended per kilogram of growth for hogs. The indicator is high if one takes into consideration the fact that most of the farms consume three to four-fold more fodders to obtain a kilogram of meat.



Vitamins do not only contribute to a considerable saving of fodders. They are literally irreplaceable. Each of them has its own precisely determined service in maintaining the normal functioning of the organism. Prolonged deficit of any kind of vitamin causes a corresponding vitamin deficiency in the animal, or, plainly speaking, disease.

It has also been established that vitaminizing the fodders has a direct influence on raising the quality of the milk, eggs and other products. We must not forget that man obtains vitamins mainly through food products, and only in rare cases resorts directly to commercial vitamins in prepared forms. Therefore, an increase in the production of vitamins for agriculture is, in the final analysis, vitaminization of the nutritional products for the country's population.

It is possible that the reader is thinking: perhaps, all the same, this is an inadmissible luxury--to produce vitamins for agriculture! All right, there is obviously a need to analyze the basic fodders prepared for the winter, from the standpoint of their vitamin content, especially carotene. Carotene is justifiably called the growth elixir, that is, the factor that essentially determines the efficiency of the production of meat and other products.

In the last few years a group of scientists headed by Professor V. Maksakov, head of the Department of Animal Feeding of the Khar'kov Veterinary Institute, established that in the main source of vitamin A--the vitamin supply for animals--silage, prepared from corn of milk-wax ripeness without using an antioxidant, a large amount of carotene is broken down.

The situation is no better with hay, which, after silage, is one of the main sources of carotene in the winter for cattle and sheep. If an analysis is made of the statistical report of the USSR Ministry of Agriculture, there is convincing evidence that only 10-15 percent of the hay procured is of a satisfactory quality. Finally, there is the so-called vitamin grass meal. It is produced from alfalfa and other greens at each farm. By December-January, as studies show, there is practically no active carotene left in this meal, prepared without stabilizers (santochene, etc.).

Therefore, there is obviously not enough carotene in the basic types of fodders, and this means that the feed rations are also impoverished. From this come frequent vitamin deficiencies, which result in a reduction in the growth of the animals, a drop in the milk yield, calf diseases, etc. The problem of enriching the fodders with vitamins and other biologically active substances is thus of great importance for the state.

Are there ways to solve it? Microbiologists have already found one of the answers to this question: there must be large-tonnage industrial production of protein-vitamin concentrates. The well worked-out industrial processes for obtaining nutrient yeasts and some types of fodder amino acids are already widely known.



I should like to discuss in more detail vitamin preparations of microbe origin. A group of scientists directed by academicians G. Skryabin and A. Imshchenetskiy bred a fungus culture rich in carotene. The dried biomass of this culture, in addition to beta-carotene, protein, fats and indispensable amino acids, also contains over 20 other biologically active substances, including group B vitamins. Tests of this biomass, introduced into the feed, were made using a large stock of hogs, poultry and other animals by the Kuban Agricultural Institute, the Don Institute of Agriculture, The All-Union Scientific Research Institute of Animal Husbandry and other institutes and farms in the country. They showed that adding to the fodder a biomass of a fodder preparation of microbiological carotene (KPMK) increases the weight gain of animals up to 15 percent and of chickens--by 14-34 percent, reduces the expenditures of fodder by 15-30 percent, increases the issue and safety of the calves, the quality of the milk, meat, etc. As was shown by studies made by the All-Union Scientific Research and Technological Institute of Poultry Breeding, the use of KPMK with a content in one kilogram of biomass of 5-10 milligrams of beta-carotene for broiler chickens (instead of vitamin A) not only has a favorable effect on increasing the live mass, but also on the safety of the stock, the reduction in the expenditures of fodders per unit of output (up to 13 percent) and increase of vitamin A in the chicken liver. In combined feed for egg-laying hens, the use of KPMK makes it possible to reduce the norm of the need for vitamin A by 50 percent. The egg yield at the same time is increased, with an expenditure per 10 eggs of 1.5-1.7 kilograms of combined feed, instead of the 2-2.1 for the control.

A group of scientists and specialists in the vitamin industry once suggested organizing the production of KPMK at existing enterprises of the Main Administration of the Microbiological Industry at the USSR Council of Ministers and the USSR Ministry of the Medical Industry, in order to bring the output of carotene in crystalline calculation up to 150 tons a year.

The industrial process for obtaining the preparation was worked out at the Krasnodarsk Biochemical and Vitamin Preparations Combine, and in 1973 was introduced into industrial production at the Sverdlovsk Medical Preparations Plant. At that time, 2.5 tons of carotene were manufactured for the first time in our country. The capacity of this plant, however, makes it possible to produce twice as much carotene for agricultural needs.

Some workers of the Main Administration of Fodders, Meadows and Pastures of the USSR Ministry of Agriculture took a rather cool attitude toward the development of this production. Controversies arose concerning the prices for the carotene, which was made up at the plant. The Ministry of Agriculture feels that it is too expensive, and the Ministry of the Medical Industry cannot sell the output at a loss for itself. The plant was forced to reduce the production of KPMK for livestock breeding needs.

Is the position of the Ministry of Agriculture a just one? After all, even at the existing cost of KPMK, it is already paying for itself with interest at the kolkhozes and sovkhozes. According to the data of the All-Union Scientific Research and Technological Institute of Poultry Breeding and the Don Agricultural Institute, a ruble spent for KPMK at the price formed at the Sverdlovsk plant gives a yield of 19-21 rubles!

Moreover, the Ministry of Agriculture, in objecting to the price for the preparation, is taking only the carotene into account. After all, though, the preparation, in addition to the carotene, has 26 other biologically active substances. They include a broad spectrum of amino acids and vitamins. If one takes their value into account, the preparation should be priced much higher. The price formed at the Sverdlovsk plant, however, takes into account only the microbiological carotene.

Naturally, it will take time to reduce the production cost of the new product. Inexpensive new sources of the raw material must be sought, and the production volume increased. Experiments show: using wastes from the food industry as raw material, the preparation of carotene will be several times cheaper than vitamin A. In addition, unlike pure vitamin A, the KPMK biomass enters the organism along with a complex of biologically active substances. Scientists have shown that in a number of cases beta-carotene cannot be replaced by vitamin A. Therefore, KPMK should be regarded as a preparation that has no substitute. Furthermore, there is a scarcity of vitamin A at the present time. Under these conditions, it is far more sensible to make wide use of its valuable substitutes.

It must be said that in the Ukraine the efficiency of this complex preparation has been recognized, and construction is now in progress at Dnepropetrovsk of a KPMK shop, with a capacity of 1000 tons of biomass a year. It will operate by using the starch wastes from molasses production. According to the available data, similar shops will also be constructed in other oblasts in the Ukrainian SSR.

The Division of the Microbiological and Combined Fodder Industry of USSR Gosplan convened a representative conference last summer at which problems of producing vitamin preparations for rural needs were discussed. At this conference, however, the workers of the Ministry of Agriculture gave this answer to the question of just what the need of livestock breeding for carotene was: "No orders for it are coming to us from the rural areas." Actually, this is not so. The Main Veterinary Administration of the USSR Ministry of Agriculture in 1977 approved provisional instructions and the norm for the use of KPMK for basic types and groups of animals, and sent them around to the outlying districts. At the same time it was proposed that Soyuzzovetsnabprom [All-Union Trust for the Supply of Agriculture with Veterinary and Zootechnical Equipment, Instruments and Drugs] equip itself with KPMK at the established provisional price acceptable for the medical industry, and gather from the republics applications concerning the need for KPMK in 1980 and in the future. A number of these applications have

already come in from a number of republics. Now it is important to obtain orders from all the rest of the republics and to fill them.

It is to be hoped that the initiative adopted by USSR Gosplan will be developed. Microbiological production of fodder protein and protein-vitamin preparations on a broad industrial basis is absolutely necessary for adherence to the strict industrial cycle at today's livestock breeding complexes.

The potentials available to the microbiologists are truly colossal: a shop located on a total of 1.5-2 hectares, capable of putting out in a smooth flow in the course of a year a product which is of equal value in its carotene content to several million tons of raw alfalfa or hundreds of thousands of tons of carrots! Furthermore, this "industrial field" does not depend on the caprices of the weather.

I should also like to continue to rely on the fact that in the near future construction will finally begin at Krasnodar of an interkolkhoz plant with a capacity of 1000 tons of carotene biomass a year, which will be built through cooperative resources. The Krasnodarskiy Kray Soviet of Kolkhozes adopted the resolution on this as far back as 1973. The plant's output will be cheaper than alfalfa vitamin meal, and at the same time, 40-fold richer than this meal in biologically active substances--carotene, amino acids, etc.

Widescale industrial production of microbiological protein-vitamin preparations will in many ways contribute to full satisfaction of the population's needs for meat and other basic nutritional products.

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## BIOACOUSTICS

### RESULTS OF STUDIES IN ANIMAL COMMUNICATIONS

Moscow NAUKIA I ZHIZN' in Russian No 5, 1979 pp 118-122

[Article by L. Stishkovskaya: "What We Have Managed to Learn About the 'Language of Animals'"]

[Text] Bioacoustics, as the science has been named that studies the auditory intercourse and acoustical orientation of insects, fish, amphibians, reptiles, birds and mammals, is an area of zoology that actually originated some time ago. However, it was not given official state sanction until 1956 when the First World Congress on Bioacoustics met in Pennsylvania (USA) where a consolidation of the various directions of this science took place.

This article speaks to what scientists have been able to learn about animal "language" and in what circumstances animals use sound communication.

Just when you think these dull, gray days will never end, the sun appears, as if from a sense of contradiction. It stays longer and longer in the sky. And, within a short time, it is difficult to imagine when entering the woods, that just a short time ago it would have been possible to discern an artful design made from tracks in the snow. The silence is just a memory. A confusion of sounds is audible everywhere out of doors; droplets of water fall from somewhere, a melancholy whistling is heard, and there is a burst of warbling. Among the birds, there is a division of territory. Having occupied a sector, each territorial male announces it in song, warning his fellows that an incursion into his domain will not go unnoticed. Many birds, on returning to their birthplaces in spring, must first decide whether it makes sense to remain in this familiar place. The decision they make depends on how the chorus of their fellows sounds. If the chorus is strong, it means that there are many birds of the same species and, judging by everything, all the territories are occupied and it would hardly pay to settle down and establish a dynasty in this area.

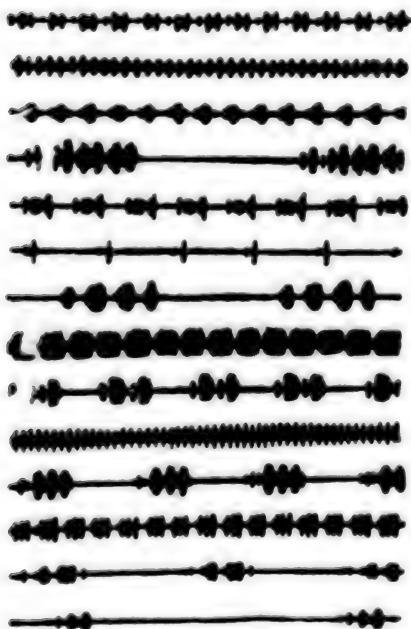
In spite of the fact that both males and females among birds are endowed with absolutely identical vocal apparatus, it is primarily the males that sing. Just as bird "serenades" sound so unlike, their meanings are the same: "I am single. I am in the prime of life. I have a territory." In the course of a

day, a male green warbler can repeat this information 2,340 times, a wood pipit will repeat the message 3,377 times and a male ten'kovka will repeat it 2,680 times. The females, who generally arrive later guided by these audible beacons, seek out males wishing to acquire families. Birds having bound themselves in matrimony do not show such diligence in singing. The male gaudy flycatcher sends out about 3,600 songs in a day while waiting for a female to appear, although once he has found himself a mate he is satisfied with a third as many.

Different birds staking out their territories generally do not protest if distant relatives settle in their domains. They will do everything possible, however, to fight off the presence of their own species. There are several explanations for this hostility. In the first place, when a dominant male acquires a mate and enters family life he should be free of a rival interfering in it. However, the main value of the territory is that here he will have access to all the food needed for his offspring to grow and develop normally. While the fledglings are small, many parents cannot absent themselves for long periods since they must frequently provide warmth. If the weather should worsen and become cold, the adults must return even more often. Thus, close proximity to food supplies is a question of life and death. And, it goes without saying, that the problem of gathering food quickly and in the necessary quantities is easier to solve when other competitors for the same type of food are not around.

Among birds whose fledglings are poorly protected against the changeability of the weather as well as those that do not experience any special difficulties with feeding (these are the grain-eating birds for the most part), the relationships stack up differently. Starlings and swallows do not object to close neighbors. Their tolerance is explained

Call signals of grasshoppers  
of different species



very simply: they are able to fly long distances from home in their search for food.

Just how large is a bird's territory? Its dimensions vary as they please; they may be quite small or extremely expansive. Among sea gulls, the domain consists of a small circle with the nest located at the center. The boundary of the territory is determined by the distance over which one bird pecks at another while sitting in the nest. Linnets establish turfs measuring from 10 to 250 square meters. The area claimed by a nightingale is larger, occupying 1,200-2,500 square meters. The minimum territory for a red-cropped pipit is 0.3 hectares and the maximum is 1.9 hectares. What would serve to restrict the size of a territory? One of the most important factors is the following: the size of a territory must be such that a male and female residing within it can receive messages that are sent when they are some distance apart.



Not only birds, but a number of other animals as well adhere strictly to the inviolability of their boundaries. About a month prior to spawning male trout select a suitable spot and inform potential intruders with a short bass grunt that they must not enter the already occupied territory.

Howler monkeys are named for their extraordinarily strident voices, and the noises that are regularly heard from some distance away from dawn to dusk. Without exception, the members of the herd all howl and the adult females are especially loud. This howling means: the masters are in their domains and it is best not to cross their boundaries. Mountain guerezas and gibbons also use their voices to mark of territories.

The Siberian lemming, an attractive animal living in the tundra, loses its composure when seeing one of its own kind close by. But, if the intruder pays no attention and does not stop, the animals stand face-to-face and make threatening noises.

An unacceptably close distance will also elicit protests among insects. Grasshoppers and crickets advertise their turfs with a threatening chirring noise on hearing an encroachment into their domains.

No matter where conflict may occur--on the ground or in the water--it is nearly always limited to rituals. Animals exhibit a complex series of poses and motions while accompanying them with sound signals appropriate to a given situation: warning cries are replaced with threatening signals. And, even when attack is inevitable, animals may still give an enemy the opportunity to reconsider, withdraw and not complicate each other's lives.

Giant sea anemones are used as homes by the brightly colored coral fish, Amphiprion. Should a predator approach, or some other danger threaten, the Amphiprion runs to his anemone and finds safety among its tentacles. But, for some reason or other, this already-occupied home catches the fancy of a kinsman. He begins to view it with increased interest, and circumstances are such that there is nowhere to go and he is left alone: the enemy is attacked. Once this has been resolved, the Amphiprion unfailingly sends out a warning: the war cry is loudly enunciated and the time to consider further action, while not great, is certainly enough.

If, in spite of the measures taken, a battle between animals should ensue, it will generally be brief. Among animals, beginning with the largest and ending

Territories occupied by two species of sparrows--warblers (circles with dots) and nightingales (dotted with triangles)

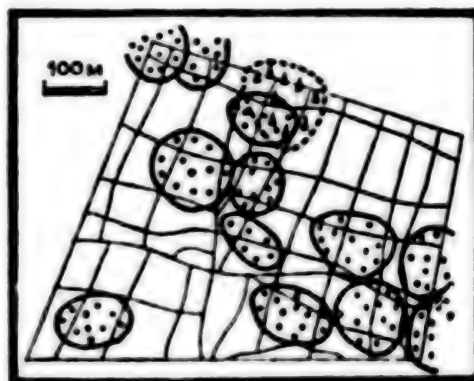




Fig. 1. Ermine in the snow.

Ermine make an effort not to encounter each other in their everyday life. But, should a newcomer nevertheless appear in a territory, its master gives a warning signal and the intruder flees. Territorial relations among ermine are different when close relatives are involved. The drawing shows a diagram of the individual domains of ermine (1), weasels (2), mink (3) and martens (4).

hind legs and, with the forepaws raised, move away chest-to-chest with small frequent steps. Tilting their heads back, they push and grab each other with their front paws and, in addition to everything else, the animals continuously clank and gnash their teeth and make loud, low and raucous cackling noises. The hold lasts for 2 or 3 minutes and the stranger retreats even though he might be larger and stronger than the incumbent.

Gaudy flycatchers conduct themselves in a similar manner. Ornithologist K. N. Blagosklonov subjected them to experiments for more than a year: the nests of these birds were moved from sector to sector. A nest belonging to one male flycatcher was hardly ever found in the territory of another, as though victory had fallen to the one whose territory held the nest. The birds then exchanged roles and the male who was the former victor became passive and yielding, and trembled with fear upon finding himself on foreign ground.

Among gray crows living in the lower reaches of the Ob' River, matters are settled in exactly the same way. A bird flying into a neighboring domain is immediately subject to attack and leaves the confines of the foreign turf in haste. However, should the victor breach the boundaries of a territory while pursuing a fellow member of his species, he, in turn, becomes the vanquished.

with the smallest rodents, an intruder generally escapes after the first offensive and any further pursuit of an enemy is of a purely exhibitionary nature.

An interesting pattern has been observed. However many disputes occur over a territory and no matter who may be involved in them, the master of the territory will prevail, often without regard to his physical attributes. The law of primacy in occupying an area is an enormous psychological advantage. Birds, and especially neighboring birds, are well aware that they are in foreign territory. There is a well-known instance in which the first sparrow appearing on his neighbor's turf suffered a heart attack from which he died: the sparrow was in a cage and could not fly away, and the master of the territory seized him by the wing through the bars of the cage. Even in completely natural settings, an "aggressor" encroaching on foreign turf is harrassed by a weaker host.

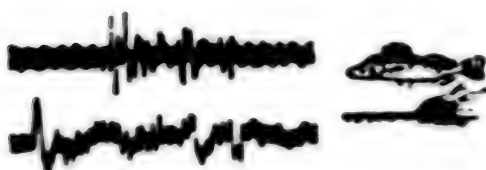
Steppe marmots, once they have decided to clarify a relationship, stand up on their



There is yet another nuance. The dominant male in a sector is also victorious because his neighbors are on his side. Recent observations and experiments conducted on the Yamal Peninsula have confirmed this numerous times. The red-capped pipit which inhabits one of the peninsula's regions has often come to the aid of comrades living nearby to evict unwelcome guests. White wagtails display no mean level of solidarity. Three males always joined forces without regard to ownership of the territory in which an outsider might be found. Jointly, they evicted the intruder every time--it was a scarecrow.

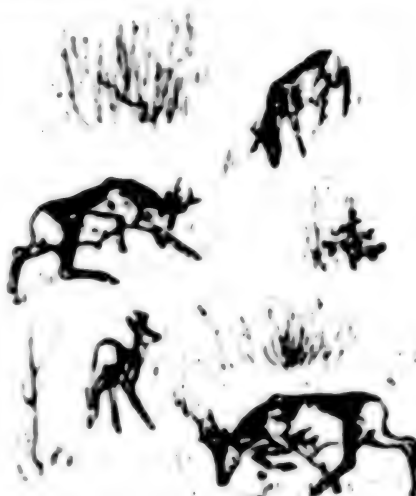
Birds are not always equally aggressively disposed in regard to their neighbors.

The threat sounds of a perch



As family life draws to a close, they become more congenial. Observations of the brown-capped nuthatch have shown that these birds spent the most time (42 percent) defending their territories while they had a nest. Later, the aggressiveness was several times less. Among woodcocks and magpies, the profile was similar: territorial battles were especially frequent during the pre-nesting period.

Roe deer announce the fact that there is a master in a given territory with cries. If the warning is not heeded, the master of the territory and the claimant (generally animals of equal strength) enter into conflict. This battle is of a tournament nature. In the illustration--the mutual threats of the rivals (top). Below, the male dominant in the sector forces a young male to retreat by threatening him with a lowered head.



Once begun, the conflict was at times resolved in an unorthodox manner. An intruder appears and recent enemies, forgetting their differences, join forces to repel him. A warning signal is given immediately. Signals of this type are sent by a large number of animals and each makes them by the means available to him; for example, garden ants thump their abdomens on the ground while wood borers rub along rotting wood. When some sort of threat is hanging over their families, destruction of their nests in particular, those in front of the nest are the first to notice the intruder. They become excited and start to send signals warning of the danger. Early warning neutralizes the suddenness of an attack and mobilizes everyone in defense of the nest.

Prairie dogs, field mice and gophers have a finely honed system for announcing and warning about the appearance of intruders. The peculiar whistling sounds that they use for this purpose quickly reach all the inhabitants of the colony. The information received makes it possible for the animals to judge the nature of approaching danger and the behavior of the intruder.

When a fox, wolf, or wolverine appears within the visual field of a long-haired gopher--he makes a series of sounds when he notices an airborne predator--there are single, much more prolonged noises. If a bird has already alighted on the ground, the gopher begins to send signals every 8 seconds. Three different cries can be heard from ground squirrels in troublesome situations.

Bird calls are even more differentiated. To say: "Attention! Danger!", chickens use seven signals. They accurately inform the others where to anticipate an intruder and what the enemy is. These signals contain information about the proximity and the level of danger.

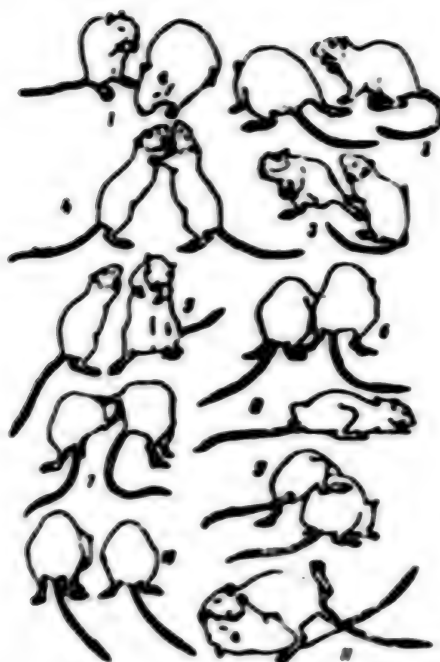
The starling likewise does not simply announce that he has spotted an intruder. A cat is stalking--one signal, a man approaches--another. Small granivorous birds sound an alarm on spotting a buzzard, kite, or kestrel and also when they have noticed a crow or cuckoo.

When a snake hisses, this is understood. Although the hissing is harmless in and of itself, it is a warning: the animal has a rather threatening arsenal at his disposal--poison glands; and, if need be, he will not hesitate to use their contents. Nature has not provided the grass snake with such a threatening arsenal although he can hiss and an enemy will retreat just the same: the "snake" sound pricks up his ears and frightens him away. This signal is so effective and universal that it is used by lizards, monitors and even birds and beasts. Cats both large and small hiss, and large sea lions hiss.

When initially confronted with danger, a fledgling horned owl first tries to frighten an enemy by acting like a snake. Furthermore, he reinforces his threat by snapping his beak. Realizing that the snapping is of no use, he begins to alternate one with the other. To frighten an enemy, he raises his wings, turns his head and also hisses. The large blue titmouse assumes a no less threatening pose and makes similar sounds. The nightjar hisses. The common wrynecks--relatives of the woodpecker--are the undisputed masters of such frightening behavior.

The relationship of animals to their young is one of the most beautiful occurrences in nature. Parental instinct is often predetermined by a particular physiological condition and is needed to preserve the species in the evolutionary process. The self-preservation with which animals protect their young and their unborn descendants and even their adolescent offspring cannot fail to provoke admiration. Magpies utter loud cries at an enemy. If a frightened jay fledgling sends a signal, the parents immediately come forward and, upon spotting the predator, they attack, filling the woods with their cries.

The behavior of large gerbils  
during conflict



Rabbits, for some unknown reason, have long been considered cowardly and irresponsible parents, but, in fact, this is not the case. When humans disturb a hare, it does not run far from its brood but remains nearby, waiting for them to leave and only then, returns to its young. At times, a female rabbit will try almost anything to attract attention to herself and draw the people away from her brood: She lies down, stands, crawls along the ground, snorts and thumps with her paws. Rabbits bravely attack kites, loons and crows. An instance has been documented where one of them was even able to frighten a small puppy away from the babies.

Vixens will bravely defend their young. There is a fox's burrow in the Karaganda region in a pine forest among chunks of granite stone. From it, the soft growling of the kits could be heard. A husky had just started to dig at the burrow when the vixen appeared. With plaintive hoarse cries, she first stopped 20 meters away and then began to come closer and closer. Having its activity interrupted, the dog finally noticed her and stole into the woods. However, the vixen soon appeared again and the husky once more shied away. When the dog returned, the vixen followed it for a total of 2 meters, making the same sounds. The dog tried a new tack. This went on for a total of 8 hours. The tired dog finally fell into an exhausted sleep on the ground while the fox ran about it howling. Having rested, the dog only frightened the animal away. It did not so much as approach the burrow.

Observations of animal behavior in various and, especially, crisis situations shows that very frequently a unique esperanto is used--signals that are perceived identically by a great many birds and animals living in the same vicinity.

For African ungulates which graze in mixed herds, whichever member of any species to be the first to notice and report danger is unimportant. No less than the ungulates, monkeys have come to understand each others' warning signals. When langurs see a predator, macaques are also advised of the appearance of an intruder by their cries.

When a human is spotted some distance away, the crow necessarily sends a prolonged rattling "ka-a-a." Hearing the warning, its fellows take off from the ground. However, they are not alone in drawing the necessary conclusions on hearing the warning. Jackdaws and rooks also understand what has been said and follow the example of the crows.

Crows are known to suffer a poor reputation in the bird world: their plundering tendencies are not secret to anyone. If these nest breakers are spotted by lake gulls, the gulls begin to cry "ka-ka-ka, ka-ka-ka." Terns, grebes and ducks also understand the warning.

All sorts of birds inhabit the islands of the Kandalaksha Preserve. But, it is up to the magpies and snipes to send the warning signal and virtually all birds inhabiting the area respond to it immediately: murrelets, silver gulls, Arctic terns, sandpipers, ducks and white wagtails. Warned that an intruder approaches, each acts as appropriate to a member of his species to avoid the danger.

Birds are able to report the fact that a situation has developed that is troublesome, not for just their close and distant kinsmen, but for other inhabitants of a given locality as well. Who doesn't know: a hunter has entered the woods, crackles the magpie and his message is understood by the deer, wild pigs and birds of prey. And the warning cry of a wood thrush serves to signal all the forest inhabitants.

There is yet another type of signal among birds that is understood by many animals. This is the cry of distress that they give at a moment of grave danger to life. Experiments have shown that field and house sparrows as well as thrushes react to such a signal given by a jay. On hearing the distress call of a starling, they fly further away from the danger area. Snipe, gulls and crows living at the seashore understand well what has happened and what conclusions must be drawn from this, no matter which of them gave the distress call.

The distress calls of a great many birds are alike in structure: they consist of short sounds that follow each other without interruption. Doctor of Biological Sciences V. D. Il'ichev has analyzed the distress cries of 15 species of birds and learned that the "pattern of pronunciation" is nearly identical for steppe eagles, cedar waxwings, barn owls, parrots, gulls and other birds.

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## ECOLOGY

### DEEP-SEA DRILLING REVEALS ORIGINS OF PETROLEUM

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 p 64

[Abstract of article: "The Composition of Bituminoids from Deposits in the Marokkansk Depression of the Atlantic Ocean" by L. Kodina, V. Generalov, M. Bogacheva in GEOKHIMIYA, No 1, 1979]

[Text] The fiftieth voyage of the prospect drilling ship "Glomar Challenger" followed the coastlines of Western Africa. For the first time in history the drilling of underwater test pits for soil samples succeeded in reaching a depth of more than 1,500 meters below the ocean floor. The depth of the sea water at the drilling site--the Marokkansk Depression--reaches 4,203 meters.

Geochemists and oceanologists are interested in how the processes involved in the transformation of an organic substance that reaches the ocean's bottom take place over a period of many centuries; in the similarity and differences in these processes and those taking place deep within the earth's core under the continents.

We know that sedimentary rocks from deep continental borings contain organic matter. Organic sediments are the dead tissues of animals and plants. Time destroys not only the tissues, but the cells and molecules as well. These molecules are transformed into bitumoids at some point--these are the substances that go to make up petroleum and fuel deposits. If there is a fractional share of bitumoids found in the organic substance of a sediment, this is indicative that the process of petroleum development has begun in suitable layers of the earth's core. This pattern is well-known for the land masses. Beginning at the depth of 1,500 meters the organic substance content of sedimentary rock increases steadily and, accordingly, the deeper a layer of sediment is found the greater the amount of bitumoids it contains. A sharp increase in the concentration of bitumoids at a specified depth is an indication that the primary stage of petroleum formation began in these layers of the earth. For example, in the area of the Western Siberian land mass this sudden shift takes place at depths of 2,500-2,700 meters.

What happens to organic sediment at soil depths beneath the bottom of the sea? While it is not yet possible to answer this question exhaustively, the depth



reached for the first time here is somewhat more than 1,500 to 1,624 meters. At continental depths of this level the processes of petroleum formation have just begun.

Officials from the USSR Academy of Sciences' Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy taking part in this expedition have studied soil samples from the record-deep borings at the bottom of the sea. These studies were begun aboard ship and completed in the Institute's laboratory for Carbon Geochemistry. The weight of the core samples was 150 grams or less (it must be remembered that a sample of this type may contain only a fractional share of organic carbon and the bitumoids and therefore might amount only to millionth's. Carefully conducted analyses have shown that the processes of transforming sedimentary organic substances at subsea depths are generally similar to those that take place in the deep layers of the earth's core under the continents. On the average, the amount of organic carbon in the samples from ocean borings is close to the level found in sedimentary rock from continental borings. In several of the cores from borings drilled by the "Glomar Challenger," the organic material was found in the form of carboniferous fragments of plant tissues with the cell structure preserved. These sediments obviously have a land origin and may well have been deposited on the ocean bottom by river run-off. At depths of 1,500-1,600 meters under the ocean floor, the organic material contains so many bitumoids that it is clear that here is where the petroleum-formation stage begins. The fact that the bitumoid concentration does not increase as a function of depth, as is commonly seen in samples from continental borings, is characteristic for the borings that have been investigated.

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## ONCOLOGY

### STUDY SHOWS TUMOR CELLS TO BE MORE SENSITIVE TO FLUORAFUR

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 pp 64-65

[Abstract of article: "The In Vitro Effect of Fluorafur on Chromosomes of Normal and Tumor Cells in Man" by G. Volgareva, O. Sokova and Ye. Pogosyants, GENETIKA, Vol XV, No 1, 1979]

[Text] Just what is the mechanism of the effect of anti-neoplastic drugs on a diseased cell? Scientists are not yet able to provide an all-inclusive answer to this question but they have been successful in solving some of the problems on the way to resolving this question and the questions of the tumorous growth of cells.

Officials from the Oncological Science Center of the USSR Academy of Sciences have been investigating the effect of fluorafur on human blood cells.

Fluorafur is a chemical compound resembling pyrimidine in structure which has the hydrogen atoms replaced by atoms of fluorine. Pyrimidine is known to play an important role in the vital cell processes with these nitrogenous bases becoming a part of the nucleic acids. Fluorafur, which is a "faulty" pyrimidine with fluorine, on the other hand, suppresses cell replication.

As experiments have shown (these tests were done "in vitro" on a tissue culture of lymphocytes from human peripheral blood and cultured tumor cells of Burkitt's lymphoma), fluorafur has a different effect on normal and tumor cells. In the tumor cells, the fluorafur induced damage to the cell chromosomes--one of the chromosome segments disappears. The higher the concentration of fluorafur in the experiment, the greater the number of damaged chromosomes found in the tumor cells. Normal blood lymphocytes were only slightly subject to the mutagenic effects of fluorafur--here the number of damaged chromosomes was 6-7 times less than in the test with tumor cells. The number of "faulty" chromosomes in the normal cells was not in any way affected, even with an increase in the dosage level of the drug. For this reason, fluorafur does not appear to be mutagenic for normal cells.

However, the small percentage of "broken" chromosomes in normal cells is indicative of the fact that a population of healthy lymphocytes is not homogeneous



and that among them, there is a very small group of cells that exhibit a special vulnerability to fluorafur while the tumor cells, for the most part, had an enhanced sensitivity to this drug.

Several questions still remain unanswered. Are the differences in sensitivity between tumor cells and normal cells associated with individual properties of the fluorafur itself or is this a universal reaction of tumor cells to the action of any kind of cytostat--a preparation which inhibits the replication of cells? To what extent the increased sensitivity to mutagens is characteristic for all tumor cells also remains unclear.

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## PSYCHOLOGY

### VARIOUS TYPES OF INTELLIGENCE DESCRIBED

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 pp 90-93

[Article by A. Luk, Senior Science Associate, Institute for Scientific Information on the Social Sciences, USSR Academy of Sciences: "The Various Types of Intellect"]

[Text] When it is said that someone is smart, the assessment is offered on the basis of different criteria in different situations--there is no one scale to measure intelligence. An individual may understand a complex situation correctly and make a completely proper judgment. But, it may also happen that it would have been better for him to remain silent in the complex situation because his words, while accurate, were out of place. His conduct is unanimously called foolish. This is not because his judgment is superficial or wrong, but because he is without tact. It follows that restraint and tact are also components of intellect. "There is nothing more stupid than unrequested wisdom," wrote Erasmus of Rotterdam.

There are also other criteria and qualities that serve as a basis for evaluating intelligence. This is because these criteria are numerous and the word "intelligence" is used to designate various personality traits and because it is possible to isolate several varieties or types of intelligence.

Conceptual intelligence makes it possible to solve logical, mathematical and linguistic problems well.

Social intelligence is concentrated in interpersonal relationships and is especially discerning in making the decision that concern human destiny, establish priorities and value orientations.

Aesthetic intelligence strives for an awareness of form in phenomena without necessarily being interested in their causes or practical usefulness.

Working, or "productive" "technological" intellect allows one to understand clearly in any situation what needs to be done, what technical possibilities, strengths and resources exist (including one's own muscular energy) and to perform a task in the best possible manner with a minimum expenditure of time and effort.

## Conceptual and Social Intelligence

In the assessment of intelligence the quality consisting of the ability to gauge the innermost thoughts of others, to penetrate their hidden motives without allowing oneself to be manipulated or subject to false hopes is frequently singled out. Social intelligence is not randomly differentiated from conceptual intellect. A scholar studying nature does not come into conflict with a foreign will that obstructs him and interferes with his understanding of the universe. "God is highly sensitive but not malicious," wrote Albert Einstein. In other words, it is not easy to come close to an understanding or prediction of the phenomena of nature: the search for the key to the complex code by which nature enciphers her laws requires enormous mental strain and painstaking work. No one is deliberately trying to mislead the scholar here and no one knowingly gives deliberately false information.

The picture of interpersonal relationships where it is sometimes better to mislead others while guessing at someone else's thoughts is altogether different. Man's awareness causes him to be powerfully transformed, to put himself in someone else's place and to understand with some degree of likelihood what another person is thinking in a given situation. Judgments of the type, "he is thinking this or that" are called the first level of reflection. And, we can go on even further: "he thinks that I have made up my mind to do this or that. Therefore, I will do something else. But, he can guess that this is my plan (the second level of reflection) so it is better for me to reject this plan and select another" (the third level of reflection).

The process of the mutual reflection of two people was described by Leo Tolstoi in the autobiographical sketch "Detstvo": "Our eyes met, and I understood that he understands me and that I realize that he understands me." Here, the hero (Irten'yev) reached the fourth level in life. The contest of two intellects on a chess board serves as a graphic model of the process of mutual reflection.

It might be said, that he whose level of reflection is higher, is always the more intelligent, will surely emerge the victor. But, this is not the case. One must be able to assess an opponent's level of reflection correctly, avoid underestimation and, in any case, overestimation so as not to be "too clever." It often happens, as Tolstoi noted apropos of the relationship between Ellen Bezukhova and the highly intelligent Jesuit priests, that, "in the business of guile, the stupid person often bests the intelligent."

When two intellects compete on the field of life or worldly wisdom, the ability to deceive a rival while being lucky enough to avoid all the traps and escape the hidden stones is called cunning, implying an unflattering ethical assessment if not outright condemnation with this word. When we talk about intricate diplomatic talks or a general in a theater of military operations, we have something else in mind--astuteness.

In everyday conflicts of interests and efforts the outcome depends not only on the level of reflection or on the ability of one to outguess an opponent. At times, a person may perceive insincerity or trickery, but, for a variety of reasons, is in no hurry to lead the trickster into pure waters. For example, childish guile may be so obvious that it is easier than easy to unmask it. But, an adult does not wish to distress a child and acts as though he has "fallen" for it. (An intelligent child understands this and accepts it as an amusing game.) At times, an individual may see through an intriguer who is inventing or keeping something to himself for the sake of his own ulterior motives. But, he is embarrassed to call his hand and be placed in an awkward position. Out of delicacy the individual acts the fool, plays along and gives in (being annoyed with himself at times). He is by no means the more stupid, but his behavior is determined by his feelings and upbringing over and above his intellect.

Intellect and stupidity, guile and ingenuousness are linked together in extremely intricate combinations. For this reason, it often happens, as was noted in "War and Peace," that "the chief administrator, an extremely stupid and crafty man understanding the intelligent and naive count perfectly, played Pierre like a pawn."

At times, it is enough to bend the conscience just a bit and play a cunning trick to achieve success. Not everyone is prepared to do this; the sense of honor comes into conflict with common sense. Not every person can go against his conscience and break the code of honor. The acts of such individuals can appear stupid to someone held back by less rigid standards or to one who cannot imagine a system of moral values different from his own.

There are even more complicated situations, however. Understanding the nobility of incentive and giving it its due, an individual is not always able to smile at openness and naivete: "Never did I laugh as I did while reading Don Quixote when he was forced to defend himself against the convicts, who, out of the goodness of their hearts, returned him to freedom."

However, it is necessary to remember that one must confuse and confound a rival in various forms of human activity--without this, the activity in and of itself loses meaning. In individual athletic competition, the fencer uses the feint to force his opponent to make a wrong move and is thereby more likely to win the point. The fake has the same role in football and basketball. In lieu of the word "deceit," it is more correct to use the term "counter-move or even "stratagem" here. There is no doubt that any competition associated with the effect of one intellect on another encourages this type of guile.

This is in dramatic contrast to activity directed at an understanding of nature. Thus, the scientist who discovers the wonder of ingenuity while setting up experiments, who finds wit in the process of designing instrument, bold fantasy in the advancement of hypotheses or exactingness and encounters of criticism in the evaluation of scientific results may appear to be a trusting simpleton in daily "worldly" matters (although this, of course, is not necessarily the case).

Attempts by modern psychologists to study creative thought through the use of different chess problems as simplified models of problem situations have often been inconclusive since they do not make allowance for an important difference; the solution to a chess problem assumes reflection when thoughts "of oneself" alternate with thoughts "of the opponent." There is no such alternation in the thoughts of a scientist for nature does not try to confuse and confound him.

### Aesthetic and Working Intelligence

The term "aesthetic intelligence" is not commonly used, it being preferable to talk about artistic flair or aesthetic taste. And yet, the capacity for aesthetic judgment is not simply an intuitive gift, but is actually a form of intelligence for which there exist several gradations or levels.

The first level is when an individual decides the beauty of some object, or, shall we say in the simplest form, distinguishes an attractive object from one that is not. The second level is the ability to isolate and point out the reason why it is attractive or not; that is, to find the aesthetic flaw. The possessor of the third level of aesthetic intelligence can mentally picture what and how it should be corrected with subtractions or additions to make the object more refined and pleasing to the eye. And, finally, there are those who can make the corrections themselves to make an object attractive. Only those who have the necessary skills, training and technique, those who are able to work with their hands, can have the highest level of aesthetic intelligence. It was not without reason that Leonardo DaVinci wrote: "In speculative reasoning, there is a lack of experience, without which, authenticity is not possible." The highest levels of aesthetic intelligence are developed not so much through contemplation as through the process of one's own creative effort.

The aesthetic mind cannot always base its judgment on what is or what is not attractive on logical arguments. It is conceived in other "codes," other symbols--shape, light, sound, etc. But, aesthetic judgments can be translated in principle to the language of words. An art critic is called to translate his intuitive taste assessments into the generally accepted language of discourse. Here, as we have noted above, superior artistic judgment is the exclusive province of the person who has not merely studied aesthetics with diligence, but is also an active participant in the creative process. It is not possible to expect the same sort of professionalism from him as, shall we say, a composer or from an artist, but nevertheless, he must know the technique



of a work other than by hearsay or "close inspection" but actually with "his own hands." Otherwise, his opinions with their unimpeachable structured phrases will be without any meaningful content.

It is not by chance that the words "intelligence" and "to be able" are from the same root. In addition to conceptual, social and aesthetic intelligence, there is yet another--most important--variation of it. This is the intelligence which originates and is established in the occupational activity of a harvester of fruit, a hunter, fisherman, cattleman, ploughman or artisan. This intelligence is seen in solutions to the concrete problems of material production.

It is not without reason that certain people are said to have not simply "golden hands" but "smart hands." This type of intellect might be called practical from the ancient Greek "praxis" meaning work, were the word combination not already in use in another meaning. For this reason, we will stay with the term "working intellect" and stress that this productive and technological intelligence serves as the precursor and source for all other types of intellect that have been differentiated and separated from it.

This sort of detail is present in A. A. Ignat'yev's book, "50 Years in Formation." The author, son of the Kiev governor general, Count Ignat'yev, was tutored at home prior to his acceptance into the corps of cadets. Carpentry work and the use of a lathe was also a part of the program for his education along with other subjects. The governor had no intention of making his son a laborer, but he did understand that the acquisition of working skills is an important component of intellectual development. Intelligence is generated and formed in work, stupidity is the product of inactivity and idleness.

The four types of intelligence listed do not occur in a pure form, of course. The image of a scholar having only conceptual intellect and an artist only aesthetic intelligence is entirely too sketchy and, therefore, inaccurate. The combination of conceptual and aesthetic intellect was a chief characteristic of A. Michelson, the experimental physicist. Einstein said of him: "Dr Michelson was one of the finest artists in the world of scientific experiment." Michelson's biographer wrote of his efforts: "These fruits of scientific and artistic creativity excite the imagination." The scientist himself was even aware of this. In the report, "An Analysis of Forms," he pointed out: "this subject needs an investigator with the analytic mind of a scientist, the aesthetic perception of an artist and the picturesque language of a poet." This aspiration to perfection, symmetry and refinement in results often acts as one of the primary motivational forces of scientific research.

Every normal man has all the different types of intelligence, but in unequal proportions and ratios. Persons with a low index of conceptual intelligence often have high readings in aesthetic, social or productive intelligence and achieve success in the arts, social activity, teaching, politics, invention, or the artistic trades, respectively.

### More on the Criteria of Intelligence

Neither the ability to advance ideas nor self-criticism, depth or judgment or objectivity can, in and of themselves, be considered to be the determinant indications of intelligence.

In some situations, flexibility of mind and, at the same time, the ability to refrain from false overtures or unobtainable goals comes to the fore. Yet, even this absence of inertia is not the primary criterion of intelligence.

In "Dead Souls," N. V. Gogol' recounted in regard to the teacher Aleksandr Petrovich, who, having selected the most gifted students, "announced that while he had heretofore required simple intelligence from them, he now demands a higher level of intellect. Not the intelligence that can chaff the fool and laugh, but that which can endure any insult, pardon the fool and not lose its temper..." This is what he considered the highest level of intellect. To maintain a high level of serenity in the midst of whatever distress man must tolerate--this is what he called intelligent.

"If a man does not grasp humor, he is as much as lost! But, you know that this would still not be true intelligence, even if a man were Solomon." These words from A. P. Chekhov are cited as confirmation of the fact that a sense of humor is an important element of intellect.

Ernest Renan, the historian, philologist and writer felt that one's attitude towards the puppet theater can serve as a criterion of intelligence. Naive, simple-minded people view the presentation with their mouths agape and take everything that happens seriously. Those who are somewhat more intelligent note that the doll is moved by a string and, from the height of their realization, scornfully reject everything as pure sham. Only the most truly intelligent individual sees the strings, the technique, that is, but this does not stop him from enjoying the art.

Renan's criterion is a good one but still is not absolute. In all probability, there cannot be any single, all-encompassing criterion here. Intelligence is a set of qualities that cannot be measured separately or independently of each other. The interplay of these qualities also determines the level of behavioral intelligence. Taken independently they are not the same as in their combined functioning. A verbal definition of what intellect is helps little in clarifying the essence of this concept which escapes rigid formulations. Ozhegov's dictionary provides the following interpretation of "intelligence": "a person's ability to reason; the basis of conscious, rational life.")

There is no precise quantitative measure of intelligence although gradations of intelligence are generally recognized in everyday intercourse and we say that A is bright but B is more intelligent. Among the numerous interwoven criteria by which this conclusion is reached there are also standards of



variability. The strongest intellects are, as a rule, the more dynamic. The intelligent man is not the same today as he was 5 years ago and 10 years from now he will not be the same as today. He does not simply accumulate knowledge and experience but rather, undergoes change himself--his values, tastes, preferences and circle of interests change. He may become indifferent to things that once pleased him and, conversely, he may come to like things he once passed without noticing.

An intelligent actor plays his favorite part differently at 50 than he did at 40. The physician, scientist and writer also change their self-images. The unwavering permanence of views, tastes or interpretations in which pride is taken is by no means an indication of great intellect. Intelligence is not a static concept, and true intelligence is in a continual state of growth.

### Intelligence and Personal Maturity

Thus, while there is no absolute measure of intelligence, there is an average concept of intelligence for a given group of people, a given collective or a given population. The intelligence of any individual is evaluated by comparing him to an average mental standard. However, since this comparison frequently takes place unconsciously, it may be doubtful: Is there, indeed, such a correlation?

We will look at evaluations of children's intelligence. When we say of a 6-year-old that he is an intelligent and bright child, this conclusion takes some standard average level for children of this age into account. If a 12-year-old displayed the same types of behavior, no one would call him intelligent.

It is to the point to note that the 12-year-old might be very well educated. He studies subjects in school that require subtlety and excellence of mind and he is able to understand and master very complex things. Yet, he is emotionally immature: he comprehends the proof of a theorem more easily than the logic in the acts of a book or film hero. For this reason, he might burst into laughter at the wrong point in a movie. To an adult this laughter may not be understood and appear "wild." But, it is simply a matter of insufficient maturity in the adolescent as a personality.

The question then arises: What is personal maturity? What are the criteria of psychological maturity? What kind of thought has been invested in this term?

Personal maturity is the transition from the dependent position of a child to independence, from a subordinate place in the family to equality, from carelessness in attitude to an understanding of his own responsibility, from a limited number of modes of behavior to a vast and diverse behavioral repertoire and from primitive interests to more complex ones.

There is a very important transformation from the shallow temporary perspective to the scale of years and decades, that is, from impulsive acts in pursuit of

"short-term goals," to behavior which is based on the whole of preceding experience and determined by very remote goals. The capacity to provide one's own motivation and to shun the instant gratification of desires for the sake of achieving consciously planned future goals develops during this period.

The cultivation of sensitivity is a necessary element of personal maturity. On this point H. Hesse noted, "truth must be experienced rather than taught." Cultivation of sensitivity presumes a wealth and variety of experience, the ability to control one's emotions and to avoid being a pawn of blind passion; the cultivation of sensitivity also presumes a readiness to understand and respect the feelings of others.

A "sense of proportion," that is, psychological and, even more so, emotional balance is an important component of personal maturity. Great events demand great feeling on the part of the individual. However, in everyday activity he must favor efficiency and strenuous concentration over the stormy boil of passions which at times only interfere with the job at hand.

A point of view which balances the depth of feeling to the difficulty of a task as well as to its degree of urgency is the most acceptable. It is assumed here that a person in a position to evaluate the importance and complexity of a problem and at the same time able to control his feelings has control over his emotional life. Without this there cannot be any "sense of proportion" which is a definite component of intelligence.

All the criteria listed above are subconsciously incorporated into evaluating the behavior of not only children, but adults of various age groups as well whose intellect is subject to totally unlike demands.

#### Conclusion

Psychological literature nowadays frequently contrasts scientific thinking and "mundane" thought. Actually, information about the characteristics of memory and the feelings that occur in man differs empirically and substantially from the data obtained in the laboratory by means of fine experimental procedures with subsequent refined mathematical processing.

Nevertheless, the arrogant treatment of "mundane thought" is not justified.

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## PUBLICATIONS

### NEW ENCYCLOPEDIA ON WORLD LANGUAGES

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 p 65

[Abstract of article: "Publishing the Encyclopedic Work 'Languages of the World,'" VESTNIK AN SSSR, No 2, 1979, by V. Yartseva]

[Text] Scholars from the USSR Academy of Sciences' Institute of Philology are involved in the publication of the 15-volume encyclopedia, "languages of the World" which will contain a description of all the languages known today.

There are "major" and "minor" languages, that is, languages that are native to millions (for example, thirteen languages are known to be spoken by more than 50 million people each) and languages spoken by only a few thousand people. Linguists still cannot answer the question of how many languages exist today on our planet. Various handbooks give different numbers: from 5 to 8 thousand. Scholars are convinced that in the regions of Guinea, Australia and Melanesia alone there are at least 1,400 languages, many of which have never been described.

Minor languages do not exist for philologists. Very often, it is precisely those languages spoken by only a few thousand people that aid linguists in understanding the origins and native associations between the "major" languages.

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## PUBLIC HEALTH

### ALCOHOL AND THE NERVOUS SYSTEM

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 pp 34-37

[Article by Yu. Savel'yev, candidate in medical sciences]

[Text] A young man is brought to the hospital by a "First Aid" vehicle in serious condition. He is stuporous. His pupils do not react to light. There is no reaction to pain stimuli. His skin is pale and cool to the touch. Raised arms flop like sticks. His heart function is impaired. Respiration is disrupted and stertorous, there is foam at the mouth. This condition, called alcoholic coma, was the result of poisoning by alcoholic beverages.

Even in an active treatment situation, alcoholic coma can develop with disastrous speed, it lasts for a very brief time and not infrequently ends in death. Numerous investigators both at home and abroad have often noted the high mortality rate among alcoholics. Even during the last century, the Russian physician I. A. Sikorskiy dubbed alcohol "the great assassin."

With the abuse of alcoholic beverages among young and middle-aged persons, not to mention the elderly, physicians have observed yet another serious complication--cerebral hemorrhage. Bleeding compresses and displaces the brain tissue, places the vitally important regulatory mechanisms of the central nervous system in a state of disorder and causes disharmony and chaos in its functioning. The general condition of the patient becomes serious. Consciousness, cardiac function and respiration are disrupted. On one hand, there is paralysis of the extremities. The body of an alcoholic lapses into a critical state. It is only as a result of tremendous efforts on the part of medical personnel and the draw of a vast arsenal of drugs that some patients can be saved. After prolonged therapy in a hospital setting, movement may be partially restored to paralyzed extremities. Patients gradually begin to move about on their own and to provide simple self-care. But all of them will remain serious invalids for a long time, needing continuous medical supervision in the care of relatives. In this process, unfortunately, they do not lose their sick attraction to alcohol for the rest of their lives, which are frequently short and are spent under the tragic stigma of a tortuous pursuit of a chance to take a drink.

inebriate becomes swinging and clumsy, his gait is unsteady. The drunkard has difficulty maintaining his balance while walking and frequently falls. There is a great deal of slobbering, catarrhal symptoms and perspiration, the palms and soles of the feet are covered with a sticky film later on. The senses of taste and smell are blunted. The pulse quickens and there are unpleasant sensations in the area around the heart.

The bad feeling continues, even the next day after an alcoholic binge. A person tormented by headaches and experiencing the feeling of having been beaten all over, nausea which frequently culminates in vomiting, promises himself not to touch "this filth / stuff" again. But not everyone can keep his word to himself. And, if this person should continue to poison himself periodically, after a short time he notices that he can tolerate alcohol much more readily. This allows him to consume ever increasing amounts of the poison without especially unpleasant sensations. He is prepared to be proud of the fact that he can drink a great deal of liquor and stay on his feet in the process and expects to boast of his "tolerance" ("without batting an eye"). But, this is nothing to brag about. This is the transition to being a drunkard and the first step towards chronic alcoholism. The nervous system is becoming accustomed to the frequent use of strong drink.

At the stage of social drinking and the transition to the early stages of chronic alcoholism the damage to the nervous system is not severe, it has not become permanent and will disappear rather quickly on withdrawal from intoxicating beverages. During this period it is possible to see symptoms of nervous system irritation occurring primarily during the state of intoxication and on the next day after imbibing. These include excitability and a lack of restraint, headache, dizziness, and nausea. The least irritation of the nasopharynx causes vomiting: the drunk cannot clean his teeth or rinse out his mouth. He has tremors of the hand, head and the tip of the tongue. Clumsiness is noticeable when he tries to pick up an object and food sloshes in the spoon. His gait is unsteady. Tendon reflexes are high, sometimes responding to even a light touch on the tendon. There are pathological reflexes. The hands and feet, and occasionally the entire body, become extremely diaphoretic. The vegetative nervous system, and especially its central branches, are traumatized with particular frequency during this period; the trophic (nutritive function) of the body is disrupted, and in the end this leads to a drop in resistance to unfavorable external influences and infections. It is particularly important that adequate quantities of nutrients, vitamins and oxygen are not absorbed in the brain. This results in a disruption in the metabolic processes of the central nervous system.

With the onset of chronic alcoholism, the symptoms of nervous system irritation that we have outlined become all the more pronounced and permanent. Where they disappear after lingering for 3 to 5 days after drinking during the early stages of alcoholism, they persist for 5 to 10 days, or at times, even twenty days after a complete break from liquor during the later stages. New symptoms of nervous system irritation are added: pain in the muscles and along the nerve trunks, tremorous contractions of the fingers, acute tension in the calf muscles forcing patients to stop frequently while walking.



And it all begins in childhood. At first, it is a children's game of grown-up when youngsters, imitating their elders, include elements of the behavior of persons addicted to alcohol in their amusement. Relatives frequently not only encourage children to mimic the behavior of drunks, but even actively include minors in their table talk, pour the children a glass of lemonade; and this becomes a "harmless dry" wine or an innocuous, or so it seems, beer. A toast is made. The childish hand holding a glass filled only with fruit juice is lifted towards the goblets in the hands of adults. The child is now indoctrinated in pub traditions, and the ritual of drinking becomes a part of his awareness (children are all quick to catch on). The pattern has been set.

Parents on their own initiative or on the advice of well-meaning friends prescribe small doses of wine, beer or even stronger drink for their children "for appetite" or "for sleep." Thus a substance which can only cause harm, which is capable of turning a child into an alcoholic in time, and which frequently gives rise to a picture of poisoning that is harmful to life is introduced into a child's body by thoughtless adults.

Eventually, a percentage of the children who have taken the first steps on the alcoholic path, even without the knowledge of their fathers and mothers, begins to gather around a bottle of liquor. In order to get the money for wine, children sent to the store by their parents pocket the change and sometimes even commit petty thefts. They slide through school, learn poorly, become liars and are rude to adults. Gradually, an asocial type of adolescent behavior develops. The nervous system is especially vulnerable during the adolescent years and the use of alcohol by minors can reflect unfavorably on the growth and development of the body as a whole

Unfortunately, we are sometimes forced to see how popular young people with insolent expressions amble aimlessly down the street openly carrying a bottle of liquor which they hold affectedly with two fingers at the neck or brazenly throw onto the street. The noisy band goes about looking for amusement, offends passersby while arguing or scuffling with the least provocation or without any provocation at all. Adults frequently shrug, allow the rampaging young people to have the right of way without trying to stop these hooligan displays or to call the unrestrained adolescents to order. "It's no concern of mine!"

Episodic misuse of alcoholic beverages or even casual drinking can lead to temporary dysfunction of the nervous system.

The neurological symptoms of common intoxication are well known. Initially, there is manic, playful behavior which is replaced by a depressed state of mind, headache, nausea, vomiting and dizziness. Luminous spots or zig-zags flash before the eyes. Speech is incomprehensible. Penmanship is destroyed, the drawing of letters and words changes radically. In place of properly written sentences, there are only fragments of words. The movement of an

Physicians frequently get to observe disorders in superficial sensation in the form of "gloves" and "socks" where a light pin prick in these areas is perceived as unbearable pain occasionally accompanied by a burning sensation. It is in this way, then, that the so-called alcoholic polyneuropathy develops, little by little.

Along with the symptoms of irritation, the symptoms of nervous system depression which are seen as a disruption of the thought processes, dimming of the memory, rapid fatigue, reduced capacity for work (mental work, in particular) and difficulty in speaking, begin to make themselves more and more obvious. Speech becomes poorly enunciated and monotonous. Vocabulary is sharply limited. Muscle tissue and skin become flaccid. Dryness is characteristic as is increased peeling of the skin. Muscle strength declines drastically. Tendon reflexes are initially depressed and then disappear altogether. Sensory dysfunctions are observed in the form of "gloves" and "socks" but, at this point, patients do not feel a pin prick and cannot differentiate heat and cold in the zones where the peripheral nerves are affected. At times, they cannot even distinguish between the directions of motion in the hands and feet. If there is a decisive and total abstinence from alcohol, this set of symptoms undergoes complete reversal (although over a prolonged period of time) and does not reappear if the patient avoids drinking.

Depending on the level of the alcoholic stage, the human body becomes decrepit and deteriorates disastrously. Permanent and acutely pronounced neurological impairments which gradually grow into serious organic and occasionally irreversible problems from transient functional disorders occupy a major place among the health disorders of the neglected alcoholic.

All parts of the nervous system are affected. Impairment of the intellect is progressive. It is not easy for an alcoholic to compose even the simplest discussion on an assigned topic such as describing today's weather. He does not catch the meanings of proverbs and sayings and does not easily understand the hidden meaning of allegorical expressions. The terminal alcoholic has almost completely forgotten how to perform simple arithmetic operations or solve the simplest problems. For example, one patient with a higher education asked to add three crayons and four cats wrote in response "seven crayon cats."

The alcoholic has difficulty remembering current events although memory for the past remains for some time. If a patient is asked to recall some very ordinary words, he forgets them. Over a period of years under the influence of alcoholic beverages, recollections about events in the distant past escape the awareness of the chronic alcoholic: these patients cannot recall facts about the most important happenings in their personal or social life, the names of government figures, writers, artists or even their closest relatives. Their professional expertise declines from year to year. During the early stages of alcoholic disease our patients cannot work in their former trades and become totally incompetent. They are unable to master a new trade, they are virtually untrainable and are forced to move to the most menial type of

work. Their conversations center primarily on topics associated with drinking. Speech loses its former inflection and becomes flat. The voice becomes hoarse. Tongue twisters are impossible. The written work of these patients is generally changed.

The inveterate drunk has a specific outward appearance: his face is a purplish blue, wrinkled, and has a number of dilated blood vessels and tiny hemorrhages; the hair is gray; there is frequently early balding; the teeth are decayed or missing, gums bleed; there is a foul odor from the mouth. The nutrition of these patients is severely depressed to the point of emaciation. The arms and legs lose their former mobility and dexterity, muscle strength severely declines and they become flaccid. Due to disturbances in the balance mechanisms, the gait of these patients becomes unsteady and less accurate. Alcoholics commonly have difficulty staying on their feet and fall frequently, hurting themselves at times.

Those who abuse alcoholic beverages stop looking after themselves and become slovenly: the outer clothing is baggy and dirty and worn by some directly over the naked skin. The home of the alcoholic debauchee is dirty, smelly and frequently without furniture. Bottles and trash are thrown into the corners and on the floor. An atmosphere of conflict permanently reigns in the household. There are endless calls to the police, frequent trials in the comrades' courts without any positive effect on the behavior of the alcoholic until there is a final incident leading the drunk to a place of confinement. After the punishment, everything starts again--the so-called alcoholic degradation of personality is progressive in its social aspects.

During the period of organic change in the nervous system, alcoholics have more and more frequent convulsive seizures with loss of consciousness, tongue biting and urinary incontinence and there occurs the so-called alcoholic epilepsy. Convulsive seizures come on suddenly and can occur during working hours, on the travelled portion of a road, behind the wheel of a car. Thus, alcoholic epilepsy results in disqualification: these patients cannot and must not be given the right to work in transport, on the water, in high places or near large pieces of equipment.

Alcohol is a cause of extremely diverse disorders in the peripheral nervous system and the muscles: myalgia, neuralgia, polyneuropathy, radiculitis, plexitis, and paralysis of the peripheral nerves.

Those who abuse alcoholic beverages frequently complain of pain in the muscles (myalgia) between the shoulder blades, the small of the back, and the leg muscles. Frequent chilling and cold-like illnesses contribute to the occurrence of muscle pain.

In advanced alcoholism, polyneuropathy (multiple involvement of the peripheral nerves) is seen to be considerably more severe and its manifestations are more permanent. Generally, it develops after sudden withdrawal from the use of alcohol. Pains occur in the arms and legs, the muscles are quite painful to

the touch and their strength declines to the point that patients are sometimes incapable of independent movement. Patients do not feel a pin prick in the areas of the shin or ankle, forearm or wrist. Trophic ulcers and edema develop on the feet of some. This syndrome persists for several months, even if the patient decisively retreats from his friendship with Bacchus. Later, in a setting of supportive therapy, movement gradually returns in the extremities, there is sensation once again, and the patient slowly begins to walk again with a cane. However, complete restoration of health cannot be guaranteed. Muscle weakness lingers, the tendon reflexes may not be restored while the skin on the feet and palms is shiny and thin like parchment. During the period of destructive changes, the peripheral nervous system is especially vulnerable and should the consumption of alcohol be resumed, the picture of its effects develops in a generally accelerated and more serious version of the symptoms of this complication. During the cold portion of the year, there is the possibility of frost bite due to impairment in temperature sensitivity (patients cannot distinguish hot and cold), which in turn exacerbates the course of polyneuropathy.

Among persons suffering from alcoholism, it is frequently possible to find paralysis of the radial nerve in which finger and wrist drop are typically characteristic. This occurs in alcoholics caught in an uncomfortable position, compressing the hand with the head or body. These patients cannot flex the wrist at the radiocarpal joint. Of course, they lose their ability to work until there is medical intervention.

The fibular nerve is frequently injured in alcoholics--the foot hangs, flexing it back becomes impossible and there is the typical "rooster strut." If timely treatment is not begun and the drinking stopped, the paralytic symptoms remain for the rest of their lives.

Low back pains are a major factor which contribute to decline or the total loss of capacity for work among alcoholics suffering from sacrolumbar radiculitis. Because of the unbearable pain, they are unable to take care of themselves, they stop sleeping and eating, they become irritable and are forced into bed rest and care. These patients are kept in bed a good portion of the time; if they try to turn over in bed or to stand, they experience sharp pains, they scream and curse. Research has revealed distinctive symptoms of tension in the affected nerve (intensification of pain on movement) which force the alcoholic to assume various obligatory protective positions as well as limitation of motion in the spinal column and strain in the long muscles of the back with their protrusion on one side.

During the winter months, persons suffering from alcoholism are particularly prone to colds and infectious diseases. A serious condition develops in drunks. Consciousness is frequently impaired. There is severe headache and vomiting. The temperature reaches critically high levels. There is fever. Respiration is noisy, stertorous and accelerated. The facial features are sharpened. Heart function is impaired: the arterial pressure and pulse are hardly discernible. Random movement is often replaced by the complete absence of motion.

The retracted head cannot be moved towards the chest. The legs are flexed at the knees and it is impossible to straighten them. All these symptoms are an indication of severe inflammatory disease of the brain and its membranes. A great deal of effort and the use of highly effective medications are needed to save such patients from inevitable death. Although they can be saved, this, unfortunately, is not always the case.

We have discussed only a small segment of the neurological complications observed in alcoholics. Only narrow specialists are aware of the majority of such disorders. It is believed, however, that these examples are sufficient for everyone to be able to understand what a disastrously destructive force is hidden in alcohol.

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## SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

### RESPONSIBILITY OF SCIENTISTS IN THE MODERN WORLD

Moscow NAUKA I ZHIZN' in Russian No 5, 1979 pp 60-63

[Article by Academician V. Engel'gardt, Director of the Institute for Molecular Biology, USSR Academy of Sciences: "The Responsibility of the Scientist and Worldwide Problems of Modern Times"]

[Text] The global problems which affect the population of the entire earth are characterized by phenomena of crisis proportions; situations occur spontaneously that require exceptional measures to overcome them.

Mankind has long been aware of crises brought about by the elemental forces of nature--earthquakes, floods, and drought. These crises are of a local nature and are of limited duration. They are produced by forces of nature that are external in relation to man; man is their victim but not their cause.

In contrast to this, the accepted global scale of today's crises can be viewed as a result of the actions of man himself associated with private capitalistic practices. These are "anthropogenic" crises, so to speak. They include the raw-materials, energy, food-supply, ecological and other such crises.

In addition to these crises of a material nature, global crises affecting the spiritual world of man are also known. We speak, for example, of the information crisis. The fact is not just that the flow of information exceeds our ability to assimilate it in a quantitative sense. Within a class-antagonistic society, there is the risk that information is transformed into its antithesis --into organized misinformation which is intended to have a negative effect on the psyche of man and on his behavior.

Members of the humanitarian sciences are devoting increasing amounts of attention to what they call the "identity crisis," the essence of which is man's loss of an understanding of his place in society and his own personality in the setting of modern capitalism. This crisis has also been depicted as a world crisis and a discussion of it follows below. I mention this now to emphasize the following: while focusing attention on the global problems which affect the population mass and even mankind as a whole, scientists do not, in the final analysis, have the right to ignore the most important thing--the man, the person, the individual.

The attention of many scientists today has been directed towards the material environment which is external in relation to man; they are anxious about preserving it and eliminating pollution. But life urgently demands that we turn to man's "internal environment," so to speak, in order to help him find the path to his own freedom. For this reason, while solving the problems that affect the population masses, it is natural, at the same time, to take care of man as a person and his spiritual world.

The crises which have an effect on the destiny of the masses and which, at times are fraught with danger of a truly global nature impose a special responsibility on science as a force involved in the genesis of such situations and on scientists, the creators of this science.

Charges addressed to science and scientists are frequently heard and this is as it should be. After all, a large percentage of the crises that we see occur as a result of the use of modern technology and the evolution of its new forms are based on the achievements of science. Science is not simply one of society's productive forces but rather, in essence, is just about the most powerful of them becoming if not directly, then certainly indirectly, the universal source of new discoveries based on technical progress.

The roots of the global crises occurring during our lifetime lie primarily in the social and economic system of capitalism, although it would be impossible to ignore the fine peculiarities of technical progress or the range of the use for new technical resources (the atomic industry and the threat of radiation; the increase in the scale of using natural resources; the increase in the power of the mass media; the flow of new drugs with inadequately studied side effects, and so



Academician V.A. Engel'gardt speaks

forth). Since there generally exists a direct or at least an indirect association between the occurrence of a global problem and previous scientific achievements, science is charged with a certain and large degree of responsibility for a developing situation. From here it is obvious that social responsibility is also laid upon scientists who create the potential for negative consequences to occur through their efforts.

The issue of the scientist's responsibility to society has long called attention to itself. It is complex and multi-faceted and is tightly woven into the fabric of the broader issue of the ethical aspects of science.

If we may say so, a scientist assumes responsibility of a general human nature for his own activity. He is responsible for the value of his own scientific "product": exacting requirements concerning the reliability of material, fairness in the use of his colleagues' efforts, stringency in analysis and an irreproachable basis for his conclusions are expected of him. This is an elementary, albeit most understandable aspect of the scientist's responsibility. These standards have been and continue to be in force and constitute the personal ethics of the scientist.

The problem of a scientist's responsibility is much broader when we talk about the forms and results of using his work in technology and economics. It would be naive to think that the actions, the behavior of the individual scientist, has an effect on the occurrence or the course of some crisis or other. Here, we talk about something different--about the social or political position of the scientific community and about their professional ethics.

The coordinated, voluntary suspension of a number of studies in a new branch of science--genetic engineering--serves as an example of the collective action of scientists that has been accorded rather wide acknowledgement. Here, an untried technique, casual negligence or imprudence that might create the potential for a "leak" of potentially pathogenic material from a laboratory could have extremely hazardous consequences--even to include the appearance of a new, previously unknown epidemic which medicine does not have the means to control.

This question was specially debated at a conference of scientists in 1975 in Asilomar (USA) where Soviet specialists also took part. After a very sharp debate and all things considered, a resolution to announce a moratorium was adopted, that is, to stop research in genetic engineering pending development of carefully thought out protective measures that will be a guarantee against risk. Opponents of the moratorium have tried to justify their position with references to "free scientific research." Suitable regulations on genetic engineering projects have now been passed in the majority of nations and, in a number of cases, these are even of a legislative nature.

The "Asilomar moratorium" can rightfully be considered an example of the responsible relationship of scientists to their obligations in the face of a danger capable of bringing on a disaster of major proportions and leading to a crisis.

The problem of responsibility clearly and obviously confronts the scientist when he encounters a dilemma similar to that which occurred in medicine at the turn of the century in conjunction with the epochal discovery by Paul Ehrlich of the first drastic drug against syphilis--preparation 606. Medical science, and practice, too, at the time were guided by a principle which even now figures in the "Hippocratic Oath" of physicians. The principle which has become an inviolable law states: "First do no harm." Ehrlich advanced and courageously upheld another principle: "First do some good."

These principles are addressed directly to the responsibility and conscience of the scientist. Clearly, they have the broadest possible social significance going far beyond the framework of medical science. Such problems are constants and, as yet, no absolute prescription exists. In every instance, a scientist must weigh all the "pros" and "cons" and take on himself the responsibility for his decision.

When Ehrlich proposed his preparation, the stakes were extremely high, immense, it might be said. On one side of the scale was a terrible, widespread and decidedly global disease. On the other, a promising but incompletely tested drug and the risk of secondary and perhaps serious side effects. A scientist's responsibility is a heavy one! But the faith of Ehrlich that he was right and that the tests were accurate led the principle of "First do some good" to triumph. In spite of the risk of inflicting harm, Ehrlich was allowed to use his preparation and this serious disease was conquered.

There is no doubt that global problems have more than once induced a scientist to listen to his conscience and find the right way of surmounting oncoming dangers. And, it stands to reason, it is the business of the scientific world's social conscience and the general responsibility of scientists in cooperation with the public as a whole to combat the causes of harmful and destructive consequences, to direct scientific research so as to prevent the harm that science itself might bring about without weighing the potential consequences and inadvertently render by its involvement in the origin of some global problem or other.

One cannot believe that there is nothing left but capitulation which, of late, has been the common and distinctive reaction to the need for a scientist to make responsible decisions. It is expressed in the motto of the "counter-science" promoted in a number of Western scientific publications. These contain an appeal to suspend the progressive movement of scientific research. At one time, Georges Pompidou openly sounded a similar appeal in a speech. Addressing the general UNESCO conference, he said: "If there is no progress in science resulting in technical progress, even though it is the product of human intellect, will we see this as something strange and foreign, as something intolerable? If we are unable to join the forces of our intelligence with the dark forces of human instinct, then, is the return to a primitive state, to some new form of barbarism not a threat but a goal towards which we should aspire?" It is impossible not to see the accusation hurled at science, and this means at its creators--scientists--in these words from one of the political leaders of the Western capitalist world.

In my opinion, in the setting of a society eroded by antagonistic contradictions scientists must, to some extent, bear the responsibility for the negative consequences of scientific and technical progress, even if their involvement consists of noninvolvement and an effort to escape responsibility and where it might appear in a new form among some members of world science in the form of "noninterference," so to speak. Many elderly people can recall the deplorable fruits borne by the ill-fated principle of noninterference in international politics in the days of Munich. Noninterference bears an evil seed when it becomes the standard of conduct for scientists.

The Soviet leaders of science, therefore, welcome the opportunity to speak to the issue of the collective responsibility of scientists. Today, there are broad forms of social movement among scientists such as the Paguoshkoye movement, the World Federation of Scientists and professional unions of scientists in various countries; these organizations originated with a clearly stated and responsible goal such as the British Society for the Social Responsibility of the Scientist, and the like, for example. In the development of these movements, we see an important manifestation of responsibility by scientists in an age characterized by the occurrence of especially broad problems reaching global proportions that affect various aspects of modern life.

Now for some words on the "identity crisis" mentioned above. The problem of identity has reached huge proportions in the capitalist nations over the past few years. This is discussed, for example, in the article, "On Global Identity" from the collection, "Creating a Just World Order" which is devoted to the various issues that are strenuously developed, in particular, in the "Rimskii klub" publications.

What is meant by the term "identity"? If we speak as schematically as possible, we are talking about man's understanding of his inherent value and his relationship to the social environment. In other words, identity is man's concept of his place among an infinite number of human beings that are like him as well as different from him; it is the concept of his own significance, value, and, in the final analysis, his sense of his own essence. This understanding is determined by resolving (as a function of the nature of the social structure) the problem of interrelating the unit and the multiple, the individual and the mass, man and society.

One of the main sources of the "identity crisis" is to be found in modern urbanization. At the turn of the century, the Belgian poet Verkharn noted the "urban octopus," which, with its merciless tentacles, grasps man, who is lost in a faceless mass, dissolving him within it while it consumes his best efforts and deprives him of his feeling of self-worth.

No one can deny that there are advantages and merit to urbanization. But urbanization carried to extremes is transformed into its antithesis as has been the case in capitalism. Instead of the anticipated material gains, a dreadful spiritual gap is created for man and he loses himself in a whirlpool



of endless crowds to which he is a stranger and simply does not exist. Instead of an outstretched hand offering him the amenities of civilization, progress, or comfort, he meets the cold, unstoppable tentacles of the urban octopus. Depersonalization, the first companion of urbanism, is the source of the loss of identity.

The "identity crisis" takes on a special significance. While other types of crises--energy, raw materials, and others--have an effect on man, the individual, indirectly through industry and economics and the like, the "identity crisis" directly influences the person and affects his inner world and system of values. For this reason, in spite of its apparent ephemeral nature, this crisis is particularly cruel and its importance must never be underestimated.

The inner directed manifestation of identity outwardly concerns only the individual. But, "negative identity" is becoming an acute social problem, taking in ever increasing numbers of people in the capitalist nations today.

The notorious tragedy of Johnstown in Guyana involving nearly a thousand people has become one of the most monstrous illustrations of the "negative identity." Group suicides occurred in Ancient Egypt during the early period of Christianity as well as during the dark years of the middle ages. But nothing in modern history can come close to the scale of the Johnstown tragedy.

It is frightening to imagine the final hours of life for the hundreds of people driven into a herd by modern capitalist society and trying to tear themselves away from the clutches of a hopeless life, "losing themselves" spiritually while being impoverished in a kingdom of wealth, the kingdom of the "yellow devil." The tragedy in Guyana is an indelible black mark on the conscience of those, who, having created the structure for an unjust society, have deprived its members of a reason for living, of their self-awareness and their, may I say, "identity code."

The "identity crisis" is the result of the action of social factors and is determined by the nature of the social structure. Urbanization, where the individual is absorbed by the mass, is a primary factor although it is also accompanied by other factors. For the working population, there is also an increase in nonworking time and leisure. Filling this time with something worthwhile is a serious problem, since otherwise a feeling of emptiness which degenerates into apathy can occur. Of course, the continuous and frequently and steadily rising unemployment that is characteristic of modern capitalism and which generates a feeling of not being needed--the "superfluous man" complex--has an even stronger effect on the individual. Such are the requisite factors which come together to make up the "negative identity"; they lead to a loss of purpose in life and to spiritual destruction.

Society's aspiration to real socialism is of a completely different nature. Here, there is anxiety about full-fledged self-discovery of the person, about filling life with a positive content, about the existence of a clear goal

based on educating and shaping primarily the young adolescent generation, but this anxiety also protects strength for every able-bodied active man in a society of older age groups.

Turning to the youth of our nation, Leonid Il'ich Brezhnev has stressed the "gravity," the meaning of everything that we do together and the responsibility that we have willingly accepted on the basis of our convictions as communists and members of the young communists' league. Responsibility for everything--for success and for failure" (PRAVDA, October 25, 1978). This awareness of responsibility does not leave room for spiritual emptiness; it fills the life with content and creates a basis for the development of a worthwhile person, a positive identity leaving no room for crisis.

The task of scientists, and especially for the members of the humanitarian sciences, consists specifically of subjecting to analysis the original factors that underlie the destructive "depersonalization" of materially deprived and spiritually impoverished people afflicted by the "identity crisis," which can lead to the ultimate in "negative identity" including the extremes--desperation and suicide. Scientists are responsible for finding the means to eliminate these factors.

It may be said that scientists are innocents in all this, that it was not their efforts that have generated a hopeless world--a world of people who have "lost their sense of self." But this is not the case. Through the implementation of technology science has become the most powerful motivational force of technical progress and is essentially dependent on the social structure of society. It cannot remain foreign to man, his destiny, his present or his future. Science, its creators and servants, the scientists, must also take upon themselves the great responsibility for the liberation and subjugation of the forces of nature, for the conduct and conquest of the genius whom they have set free. Together with all progressive forces and movements they are responsible for the social destiny of mankind.

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ZINAIDA VASIL'YEVNA GORDON (FOR HER 70TH BIRTHDAY)

MOSCOW GIGIYENA TRUDA I PROFESSIONAL'NYE ZABOLEVANIYA in Russian No 6,  
1979 p 60

[Article by the Moscow Scientific Society of Hygienists and Public Health Physicians, Moscow City Prophylactic-Epidemiological Station, Institute of Work Hygiene and Occupational Diseases of the USSR Academy of Medical Sciences and the Editorial Board of the Journal GIGIYENA TRUDA I PROFZABOLEVANIYA]

[Text] On 19 October 1978 Professor Zinaida Vasil'yevna Gordon, doctor of medical sciences, celebrated her 70th birthday and 48 years of practical, scientific and pedagogical work.



From 1931 to 1934, after graduating from the Department of Sanitation and Hygiene of the Khar'kov Medical Institute, Z. V. Gordon worked in the Laboratory of Organization and Sanitation of Labor of the Khar'kov Tractor Plant. Upon completing her graduate work at the Khar'kov Institute of Advanced Medical Studies in 1939, she defended her candidatorial dissertation on "The Biological Effect of Infrared Radiation."

In 1939-1940 Z. V. Gordon worked at the Khar'kov Institute of Work Hygiene as a junior scientific associate.

During the years of World War II Z. V. Gordon was a lecturer in the Department of Hygiene of Sverdlovsk Medical Institute, organized the Department of Sanitation and Hygiene there and became its dean.

In 1945-1949 Z. V. Gordon directed the division of higher and secondary medical education in the Soviet-occupied zone of Germany, where her work was given a favorable evaluation by the Soviet Military Administration in Germany.

Establishing the problem of "Work Hygiene and the Biological Effect of Radio Waves" in our country is connected with Z. V. Gordon's name. From 1948 to 1975 she worked at the Institute of Work Hygiene and Occupational Diseases of the USSR Academy of Medical Sciences, where, under the direction of A. A. Letavet, academician of the USSR Academy of Medical Sciences, she organized for the first time a laboratory of electromagnetic radio-frequency waves, which she directed up to 1975. In 1966, for the dissertation, "Work Hygiene and the Biological Effect of Ultrahigh Frequencies," she was awarded the degree of doctor of medical sciences, and in 1967--the title of professor.

Z. V. Gordon played an important role in working out problems of work hygiene with radio wave sources and in setting up and introducing norms for various radio wave ranges. Due to the work of Z. V. Gordon and her associates and students, it was possible to carry out a major improvement in the sanitary conditions for people working with radio wave sources in the most varied sectors of the national economy.

Z. V. Gordon has published over 100 scientific works and 2 monographs, and has written chapters in textbooks and a multi-volume handbook on work hygiene. Three doctoral and 10 candidatorial dissertations have been completed under her direction.

Since 1975 Z. V. Gordon has been a consultant to the Laboratory of Electromagnetic Fields of the Moscow City Prophylactic-Epidemiological Station, and dedicates her vast experience to workers in applied sanitation supervision.

Z. V. Gordon's business and personal attributes have won her well-deserved prestige among her colleagues, associates and students. Z. V. Gordon combines her great scientific-pedagogical and practical work with social work.

For her work services, Z. V. Gordon was awarded three medals and the badge of "Exemplary Public Health Worker."

In congratulating Zinaidu Vasil'yevna on her anniversary celebrations, we  
with her great creative success, sound health and happiness.

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TOXICITY OF VNIINP-117, VNIINP-117/t ADDITIVES

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 6, 1979

[Article by N. I. Menyaylo, V. V. Sukhanov, R. V. Gorskaya, Ye. A. Dimashko (Donetsk), Institute of Work Hygiene and Occupational Diseases]

[Text] The country's coal mines make broad use of the additives VNIINP-17 and VNIINP-117/t. Some 1.5-2 percent of the water emulsions prepared using them as their base are used as the hydraulic fluid in equipment with closed and open hydraulic systems. As a result of this, the aerosol from the emulsion may enter the air of the stopes. Persons carrying out preventive maintenance and servicing of the sectional hydraulic pressure equipment, as well as persons engaged in preparing the emulsion at the mine's surface, come into contact with the hydraulic fluid. The aerosol from the emulsion may thus enter the organism through the skin and respiratory organs (preparation of the emulsion involves heating the additive in special containers).

The additive VNIINP-117/t has a complex composition. It includes the following substances: potassium thallate--15%, 1, 4-butindiol--1%, additive VNIINP-122 (mixture of naphthenic acids)--5.5%, naphthenic chromate--1%; extract of phenol purification of transformer oil (naphthene-paraffin hydrocarbons)--78.5%.

With respect to its composition, VNIINP-117 differs from VNIINP-117/t additive in that in it potassium thallate is replaced by potassium naphthenate.

There is no information in the literature on the toxicity of the two additives. Because of this, a study was made of the toxic properties of the additives VNIINP-117 and VNIINP-117/t, with allowance for the actual conditions of their use in coal mines.

**Methodology.** Acute and chronic experiments were made on white rats, rabbits (allergic effect) and guinea pigs (allergenic effect) with inhalation of the vapors and application of the additive to the skin.

In the chronic experiment (4-month dynamic inoculation) the animals were exposed to the vapors and aerosol of a 2%-water emulsion of the additive VNIINP-117/t (concentration of the additive in the inoculation chamber was respectively 1.5 and 16 mg/m<sup>3</sup>) 5 times a week for 4 hours a day. Untreated animals served as the control. In each series of the experiment there were 12 white rats each (males).

The concentration of the aerosol from the emulsion in the inoculation chambers (as well as under production conditions) was determined by a method that was devised on the basis of the reaction of certain cyclical compounds included in the additive, with alloxantin. The sensitivity of the method was 0.5 mg of 2%-emulsion of the additive in a certain volume. The probable error of determination was not over 15%. The indicators of the functional state of the white rats was determined on the 1st and 10th day of the experiment and after that--once a month.

**Results.** Single applications of the additives being studied and of their 2%-water emulsions caused no visible changes in the dermal integument. After multiple applications (10 days) of the concentrated solutions of the additives, dryness and scaling of the dermal integument of the rabbits were noted. With a single application of the additive VNIINP-117 to human skin (result calculated after 18 hours), no signs of damage to the skin were revealed.

In a study of the allergenic properties and skin-resorptive action of the additive VNIINP-117/t, no signs of intoxication were established, and there was no local reaction on the skin of the tails of the white rats.

The basic parameters of acute toxicity of the additives VNIINP-117 and VNIINP-117/t, when administered to the stomachs of white rats in native form are on essentially the same level, and are expressed by the following values: additive VNIINP-117/t--DL<sub>50</sub>=18.5±3.3 g/kg, DL<sub>16</sub>=15.8 g/kg, DL<sub>84</sub>=21.6 g/kg, and additive VNIINP-117--DL<sub>50</sub>=18.0±2.1 g/kg, DL<sub>16</sub>=11.3 g/kg and DL<sub>84</sub>=20.7 g/kg.

The rest of the studies were made only with additive VNIINP-117/t.

With a single 4-hour inhalation effect of the aerosol of the water emulsion of the additive VNIINP-117/t, the threshold concentration was 240 mg/m<sup>3</sup>. The toxic effect is manifested by an increase in the number of leucocytes after the experiment ( $\Delta$  2100 per 1 mm<sup>3</sup>; P = 0.01) and a reduction in the mass coefficient of the liver 72 hours after the end of the effect ( $\Delta$  = 0.9; P = 0.02).

With the study of the toxicity of the additive VNIINP-117/t in the chronic experiment, the most substantial deviations were detected in a 2-3-month study. By the end of the experiment a tendency toward normalization of a number of changes was observed.

Lagging behind in the mass of the animals (by 50 g), a reduction in the oxygen consumption (by 30%), an increase in the summation-threshold indicator and a reduction in the leucocyte content in the blood and hyperproteinemia ( $P = 0.05-0.001$ ) were noted with the action of the additive in a concentration of  $16 \text{ mg/m}^3$  in a 2-month study. By the 3d month, the ability of the nervous system to summate the threshold impulses and the catalase activity of the blood were reduced ( $P = 0.05-0.001$ ).

By the end of the experiment, as before, a suppression of the central nervous system and elevated serum protein content ( $\Delta = 1.7 \text{ mg\%}$ ;  $P < 0.05$ ) were noted, and a reduction in the chlorine content in the brain, as compared with the control ( $\Delta = 29.6 \text{ mg\%}$ ;  $P < 0.001$ ) and retardation in the gain in body mass were recorded.

With exposure to the vapors of the additive VNIINP-117/t at a concentration of  $1.5 \text{ mg/m}^3$ , lagging behind in the gain in mass of the animals in the 1st month was ascertained ( $\Delta = 40 \text{ g}$ ;  $P < 0.05$ ).

In evaluating the changes in the functional state of the organism brought about by the effect of the additive, it should be noted that the concentration equal to  $1.5 \text{ mg/m}^3$  is close to threshold.

On the basis of the materials presented, an amount of  $1 \text{ mg/m}^3$  may be recommended as the OBUV [specific gravity concentration] of the additive in the air of the work area. Since the additive VNIINP-117/t is similar both in composition and in toxicity parameters in the acute experiment, this value may be recommended as the maximum permissible concentration for the additive VNIINP-117 as well.

Under production conditions (air exchange in the stope  $560 \text{ m}^3/\text{min}$ ), the highest emulsion content was established in the area for performing operations to reinforce the stope. Directly at the timberman's respiratory level, in the "loading" and dismantling of the props, the concentration of the emulsion in the air is  $56 \pm 17 \text{ mg/m}^3$  (maximum value  $80 \text{ mg/m}^3$ ). A similar high content of this substance was also noted at other sections of the stope and near the hydraulic pressure equipment. In the facilities for preparation of the emulsion, with no ventilation, the emulsion concentration is  $24 \pm 1 \text{ mg/m}^3$ .

When the results obtained are recalculated for a pure additive, it turns out that its content in the air of the work area in the mine and at the mine's surface is  $0.5-1 \text{ mg/m}^3$ , i.e., at the recommended OBUV level.

When queried, the workers complained of a slight irritation of the conjunctiva when the emulsion got in their eyes and of the dermal integuments when the special work clothing was permeated. Upon examination, no visible damage to the dermal integuments was determined in the workers.

In order to prevent a possible adverse effect of the additives there must be:

An improvement in the design of the timbering with enclosed systems;

Improvement in the design of the individual props with exterior feed (smooth feed of the hydraulic fluid, preventing the fluid from penetrating the supports, increasing the reliability of the packing pieces, improvement of the nozzles, etc.);

Provision of protective goggles and special work clothing with impermeable stitching for the mine workers;

Washing of the eyes with warm flowing water (at the surface of the mine) or water from individual flasks (in the mine), when the emulsion or additive gets into them.

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PHOTOCHEMICAL TRANSFORMATIONS OF ORGANOPHOSPHORIC PESTICIDES IN THE AIR

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 6, 1979 pp 56-58

[Article by M. A. Klisenko and M. V. Pis'mennaya, Kiev, Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics]

[Text] In the last few years the photochemical transformations of pesticides have been drawing the attention of many researchers (M. A. Klisenko).

It was shown in standard experiments described earlier that dialkylthio- and dialkyldithiophosphates (phencapton, cydial, phozalon, phthalophos, sajphos, amyphos, dursban) are unstable under ultra-violet radiation ( $\lambda$  250-400 NM) when these compounds are irradiated in closed quartz test tubes 20 cm from the source of the light. The photodisintegration rate of these compounds is described by the equation for the kinetics of a reaction of the first order. The constants for the rate of the reaction and the half-lives of the insecticides are given in the table.

In the process of the photolysis of organophosphoric pesticides (FOP), products are formed that possess greater toxicity than the initial compounds.

A study of the kinetics of photodisintegration of the derivatives of thio- and dithiophosphoric acid and identification, by means of thin-layer and gas-liquid chromatography, of the conversion products showed that one of the first stages of photolysis in the presence of moisture and the oxygen of the air is oxidation of the P=S-group. Through use of the chromatoenzyme method (Akkerman), P=O-derivatives were detected that were more toxic than the initial FOP, as well as other unidentified products of the photodisintegration--cholinesterase inhibitors.

Along with the products of the photodisintegration of dursban, the formation of 6 cholinesterase inhibitors was noted, of which the P=O-derivative of dursban and the de-ethylized derivative of the latter were noted.



# Characteristics of the Photolysis of Organophosphoric Pesticides

Pesticide	Chemical name	Photolysis rate constant, min <sup>-1</sup>	Half-life, mins
Bayteks	0,0-dimethyl-0-(4-methylthio-3-methylphenyl) thiophosphate	--	4
Cydial	0,0-dimethyl-S-(1-carbethoxybenzyl) dithiophosphate	0.0600	11
Phencapton	0,0-diethyl-S-(2,5-dichlorophenylthiomethyl) dithiophosphate	0.0557	12
Gardona	0,0-dimethyl-0-[2-chlor-1,2,4,5-trichlorophenyl) vinyl] phosphate	--	30
Anthio	0,0-dimethyl-S-(N-methylformyl-carbomoyl-methyl) dithiophosphate	0.014	48
Amyphos	0,0-dimethyl-S-( -acetamidoethyl) dithiophosphate	--	60
Phthalophos	0,0-dimethyl-s-phthalimidomethyl-dithiophosphate	0.0099	70
Phozalon	0,0-dimethyl-S-(6-chlorbenzoxasolinon-2-yl-3-methyl) dithiophosphate	0.0081	86
Dursban	0,0-diethyl-0-(3,5,6-trichloropyridyl-2) thiophosphate	--	136
Abat	Bis-(0,0-dimethylthiophosphoryl 0-phenyl-4) sulfide	--	186
Sajphos	0,0-dimethyl-S-(4,6-diamino-1,3,5-triazinyl-2-methyl) dithiophosphate	0.0011	630

Stable toxic products of photolysis of dursban, as well as of phosvel, were observed in experiments using caterpillars *Spodoptera littoralis* (Abdel-Wahab). Ultra-violet irradiation of phenitrothion causes the formation of products of oxidation, isomerization and solvolysis. The basic product of oxidation is the P=O-derivative--phenitrooxon (Greenhalgh and Marshall). When exposed to sunlight for 8 hours, the amount of phenitrooxon was 4-6% of the original (Weintraub).

Isomerization under exposure to ultra-violet radiation is described with the formation of more toxic compounds also for organophosphoric pesticides such as inesin (Muraj and Tomizawa) and mevinphos (Grosby). As is known, the latter preparation is a mixture of cis- and trans-isomers. When exposed to ultra-violet light, the trans-isomer becomes 100-fold more toxic than the cis-isomer.

In standard experiments the basic products of the photolysis of phthalophos were the P=O-derivative, phthalimide, phthalic acid, and also an unidentified compound--a cholinesterase inhibitor. Particularly worthy of notice

is the formation of phthalimide--a compound with marked embryotoxic action (V. Voronina). These products of the phototransformation of phthalophos were detected in the air when agricultural work was being done.

For example, when sugar beet sprouts are cultivated by means of a POU flexible sprayer (flow rate norm 2 kg/hectare, volume of working liquid 120 liters) under high temperature conditions (average daily 18°C with a maximum of 32-35°C), low precipitation (total 68 mm) and still air, phthalophos, its P=O-derivative, phthalimide, unidentified cholinesterase inhibitors and oxymethylphthalimide--the product of the disintegration of the phthalophos--were detected in the air of the cultivated plot of land.

In periods when the average daily temperature of the air did not exceed 10°C, there were no products of the phototransformation of phthalophos.

When vineyards were treated with chlorophos by means of an OMB-400 sprayer (flow rate norm of the pesticide was 2 and 6 kg/hectare, of the working liquid--800 liters/hectare) on the 6th day the content in the air of DDVF, a toxic metabolite, almost exceeded the content of the initial preparation.

A study of the level and duration of preservation of anthio when the preparation was used in horticulture showed that on the objects in the environment there is intensive conversion of anthio into rogor, and the level of the rogor content in the air is higher than of the anthio.

Synergism of the toxic effect of the products of pesticide photolysis was noted. For example, it is assumed that cases of poisoning after citrus orchards were treated with parathion were caused by an increase in its toxicity in the presence of the product of the secondary photolysis of paraoxone--triethylthiophosphate (Grunwell; Erickson).

Therefore, the data presented attests to intensive processes of photolysis of FOP taking place in the air and the formation and long preservation of the toxic products of phototransformation.

Photolysis of FOP in the atmosphere is a complex phenomenon and depends on many factors, including the content of oxygen, moisture, temperature and the air.

At the same time, the literature has not indicated the hygienic aspects of the danger of this phenomenon.

As a rule, when the maximum permissible levels of FOP are substantiated for the air of the work zone during agricultural work and in the atmospheric air, these data are not taken into account (R. A. Kasymov), nor is there a discussion of the role of the photochemical transformations of FOP when the periods of its discharge at work are substantiated, and this is particularly important in regions with a hot climate and increased solar radiation and moisture content.

In our opinion, the need has become urgent for hygienic norm-setting for the air, water and other environments not only of the original pesticides, but also of the toxic products of their conversion and particularly of the oxidized products of FOP.

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## VETERINARY MEDICINE

### STEPS TAKEN TO CONTROL TUBERCULOSIS, BRUCELLOSIS

Moscow VETERINARIYA in Russian No 4, 1979 pp 2-4

#### [Article]

[Text] The Communist Party and the Soviet government have posed a task of great political, economic, and social significance to veterinary science and practice--eliminating animal tuberculosis and brucellosis in the country.

In the last 3 years of the present five-year plan the veterinary service has done a considerable amount of work in this direction with the complete support of party and soviet agencies. The epizootic situation is improving steadily from year to year. Cattle brucellosis morbidity has been decreased by 52 percent, and tuberculosis morbidity has been decreased by 20 percent.

Farms of the Lithuanian SSR, Latvian SSR, Moldavian SSR, Estonian SSR, and of many oblasts of the RSFSR and other union republics are practically free of these infections.

A large amount of effective work has been done to control brucellosis in the Ukrainian SSR and the Belorussian SSR, the animal farms of which are now free of this disease, as well as in the RSFSR, Uzbek SSR, Tadzhik SSR, and Azerbaydzhan SSR.

Certain advances have been noted in the work of eradicating animal tuberculosis in the Ukrainian SSR, in republics of Central Asia and the Transcaucasus, and in a significant part of the Russian Federation and the Belorussian SSR.

Much has been done in recent years to improve the planning of measures to control chronic animal diseases. A single plan of basic measures to prevent and eradicate animal brucellosis was developed with a consideration for scientific and practical achievements, and it is presently operating in the country. It clearly spells out the tasks of veterinary services in different regions of the country and of scientific institutions in relation to research on this disease. The general complex of measures for specific prevention of brucellosis includes extensive use of antibrucellosis vaccines recommended by the USSR Ministry of Agriculture.

The effectiveness of antituberculosis measures is rising. In addition to improving measures to control this infection, new diagnostic tests permitting veterinary specialists to correctly evaluate pathological changes exhibited by animals stricken with tuberculosis have been proposed. Chemotherapeutic and other preparations intended for tuberculosis prevention are being tested in certain zones of the country with the permission of the USSR Ministry of Agriculture Main Veterinary Administration.

A creative approach to solving the problems of controlling brucellosis and tuberculosis even in complex epizootic situations is promoting a decline in morbidity and complete eradication of these diseases. Confirmation of this can be found in numerous examples of eradication of chronic infections in farms of Omskaya, Kustanayskaya, Karagandinskaya, Novosibirskaya, and other oblasts.

But unfortunately not all farms in our republics are enjoying such progress yet. An analysis of the causes of persistent animal brucellosis and tuberculosis in particular zones would show that failure to take an integrated approach to controlling these infectious diseases is at the root of some of the cases, and that many local veterinary agencies and farm specialists drawing up long-range plans for eradicating brucellosis and tuberculosis from livestock kolkhozes and sovkhoses ignore instructions published by the USSR Ministry of Agriculture on this issue.

The work is often done without a consideration for the real epizootic situation in relation to these diseases at the farms and in the zones, it is not given material support, and the economic grounds for it are not substantiated.

Persons responsible for determining the amount of work to be done locally understate the number of brucellosis and tuberculosis analyses to which the animals must be subjected, they do not compute the need for specialists, helpers, disinfection equipment, decontaminating agents, and diagnostic kits, and they fail to make clear assignments to veterinarians and farm directors in relation to each specific type of job, or to indicate the times of their completion and the persons responsible. As a consequence the plans are found to be unrealistic or insufficiently effective.

To avoid such errors, veterinarians planning and implementing antibrucellosis and antituberculosis measures should thoroughly study the epizootic situation at the farms and in the rayons in relation to animal brucellosis and tuberculosis, and they should structure their preventive and eradication efforts with a consideration for the results.

The important point to consider in planning eradication measures is the number of repeat brucellosis and tuberculosis analyses to which animals are subjected with the goal of revealing sick animals as fully as possible. It should be kept in mind that in disease-free rayons and farms located in stricken or threatened zones, all susceptible animals subject to inspection, with the exception of animals undergoing fattening, must be tested for brucellosis and tuberculosis not less than twice a year (spring and fall).

These tests must be made at stricken farms strictly in accordance with the schedule foreseen by the instructions.



The volume and schedule of diagnostic tests must be planned on the basis of these requirements; after doing so, we need to consider the possibilities for having veterinarians at the farms, in the regional veterinary therapeutic institutions, and at the veterinary laboratories perform the tests themselves.

To eradicate brucellosis and tuberculosis from the farms, the most important thing to do is to reveal sick animals in herds undergoing treatment and remove them, since they are the principal sources of the disease agent. Nor can we ignore raising young animals in isolation as one of the measures of brucellosis and tuberculosis control.

A large amount of experience has been accumulated in this direction in the country; specialized farms and complexes raising heifers are now functioning. All of the conditions for obtaining healthy young animals have been created at many of them. At the same time we still encounter cases in which adequate significance is not attached to these problems at stricken farms. Calves are maintained together with other groups of animals. Milk and skim milk obtained at the farm and delivered from milk processing enterprises as calf feed is not decontaminated, and veterinarians do nothing to monitor the situation.

Successful eradication of brucellosis and tuberculosis from livestock farms also depends in many ways on the quality and times of disinfection. This is why determining the volume of disinfection is mandatory in the planning of special measures; the amount of surface area to be disinfected in livestock buildings, in feedlots, pens, and summer stalls must be established, and the work schedule must be written. The demand for decontaminating agents and disinfection equipment must be fully determined, and special attention must be turned to choosing those decontamination resources which would result in the fullest possible removal of brucellosis and tuberculosis agents from the environment.

Because there is a great shortage of disinfection resources, all farms must make an effort to clean and repair livestock buildings well and clean up the farm territory after animals are sent to pasture for the season or herded to summer camps. In the 3 months of the spring-summer period that animals are gone, natural disinfection of farms stricken with brucellosis would occur, thus reducing consumption of decontaminating agents.

However, these simple and long-known truths are not always considered. Some veterinarians fail to display adequate initiative and exactingness toward both themselves and other workers when it comes to faultless satisfaction of written requirements.

This can be the only explanation for cases where solitary points stricken with brucellosis and tuberculosis persist for a long time in a number of rayons and republics of Central Asia, the Transcaucasus, the Kazakh SSR, and some oblasts of the RSFSR, where small numbers of sick animals are kept at the farms longer than they should be, and where the plans for diagnostic tests are not met from year to year.

Because the animal brucellosis and tuberculosis situation is governed in different zones by different combinations of many factors affecting the epizootic process, the local features must be accounted for when writing plans to eradicate brucellosis and tuberculosis from particular rayons and farms, and the measures themselves must be implemented in accordance with a definite system.

Healthy farms and livestock departments and those implementing eradication measures (having a low percentage of positively reacting animals) must keep strict records of all healthy animals and groups of animals undergoing treatment. Animals at such farms must be subjected to diagnostic tests several times a year, and all animals suspected to be ill must be removed from the herd immediately and slaughtered. Such farms must maintain model sanitary order and implement all of the measures by which to prevent importation of disease agents into the farms. These farms should be used as the base for growing healthy animals to replace animals in unhealthy herds. Each of these farms must be given concrete assignments for raising healthy animals; the number of animals to be delivered, the delivery time, and the farms that are to receive these animals must be spelled out. Animals in healthy and recovering herds must be given preventive immunizations against brucellosis.

After diagnostic tests for brucellosis and tuberculosis are performed twice on animals at farms (livestock departments) characterized by a significant degree of brucellosis and tuberculosis infections (over 10 percent), all positively reacting animals as well as those immunized as adults with strain 19 vaccine in the last 2-3 years must be concentrated at isolated farms and departments.

These groups of animals must be treated as "incarcerated" animals subject to slaughter. These animals are no longer used for herd reproduction, and they are no longer tested. Any calves produced are placed in a fattening herd and slaughtered for meat in a year.

The schedule for replacing "incarcerated" herds by healthy animals is established, and the order for sending diseased animals to slaughter, making repairs to improve sanitation, and cleansing livestock buildings in which sick animals had been kept is determined.

Animals in "incarcerated" herds are replaced on first priority at farms in whole-milk zones located about oblasts and industrial cities, at breeding farms, and in rayons in which the proportions of such herds is insignificant.

Conditionally healthy animals remaining in stricken farms after positively reacting animals are "incarcerated" are subjected to additional diagnostic tests. The issue of placing them in the "incarcerated" herds or into animal groups undergoing treatment is resolved depending on the test results.

If an agricultural complex has only one animal farm, a base is created (new departments are built) before replacing stricken cattle; healthy animals are delivered to this base, and as they reproduce the sick cattle are sent to slaughter.

Milk obtained from cows in "incarcerated" herds reacting positively to brucellosis and tuberculosis is processed locally into pot butter; or, with the consent of public health agencies, after pasteurization at the farm it is sent to specially designated dairy plants where it is subjected to decontamination a second time.

In addition to the measures listed above, all farms must perform diagnostic tests for brucellosis and tuberculosis not less than twice a year (in spring and fall) on privately owned animals, remove positively reacting animals from the herds and send them to slaughter, build veterinary facilities at the farms, subdivide the pastures into lots, and assign the latter to particular groups of animals (with the consideration for their epizootic condition).

The fight against brucellosis and tuberculosis requires a considerable amount of meticulous labor, a thoughtful attitude, and serious work on the part of not only veterinary specialists but also executives of the farms and the soviet and agricultural agencies. Livestock buildings failing to satisfy zoohygienic requirements of animal maintenance must be rebuilt more actively; money should be allocated for construction of veterinary facilities and for special veterinary measures, as well as for sanitation of livestock buildings; special groups of helpers (from among the livestock farm workers) should be attached to veterinary specialists for mass animal processing, immunizations, and diagnostic tests; teams removing manure from the farms must be supplied with mechanized equipment; livestock workers must be supplied with special clothing, footwear, and other articles of personal hygiene, and mandatory periodic medical examination of these workers must be organized.

Implementing the system of eradication measures, we must consider the economics of maintaining particular numbers of cattle and fulfilling the plans for production of livestock products.

By categorizing regions and farms depending on the degree they are infected and the infection danger they experience, we create an opportunity to correctly determine the amount of work, manpower and resources required, and to plan the measures for eliminating these diseases in the optimum amount of time.

Local veterinary agencies must attach priority to animal brucellosis and tuberculosis control. By curing animals of chronic infections, they will make an honorable contribution to meeting the requirements set by the July and November (1978) CC CPSU plenums concerning growth of livestock production.

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## VETERINARY MEDICINE

### ANIMALS SURVIVED WINTER WELL IN SVERDLOVSKAYA OBLAST

Moscow VETERINARIYA in Russian No 4, 1979 pp 5-6

[Article by G. F. Lukin, Chief, Oblast Veterinary Station]

[Text] Veterinary laborers of Sverdlovskaya Oblast have organized a purposeful campaign to reduce infectious and noninfectious diseases, to improve the condition of the farm animals, and to improve the veterinary condition of the livestock farms. Owing to their labor there are no epizootics of foot and mouth disease, anthrax, swine plague and fever, and other infectious diseases at the farms. There are no farms on the oblast's epizootological map of tuberculosis and brucellosis problem areas.

The oblast's veterinary workers did a great deal of work to see that the animals would survive the winter successfully. In particular current repairs were made and buildings were disinfected and whitewashed at the farms. The bad weather of last year had an unfavorable effect on the quality of the feed procured. Consequently more than 400 straw thermochemical processing shops were set up at the farms to improve the assimilability of the feed and prevent mass animal poisonings. The shops were supplied with 109 S-12 feed mixers and 357 Saratov leaven preparing units.

Specialists of Sysertskiy, Pyshminskiy, and Irbitskiy rayons organized animal wintering well. Tuberculosis has not been recorded for many years now at farms of Sysertskiy Rayon; cattle brucellosis has been eradicated from the farms. Because the kolkhozes and sovkhozes are free of infectious and invasive diseases, the workers can capitalize more fully on the agricultural production reserves.

Constant concern over and a responsible approach to the assigned work permits veterinary specialists and livestock breeders to achieve high indices in their labor. Thus the milk yield per cow is almost 4,000 kg in Sysertskiy Rayon and 5,500 kg in Borodulinskiy Sovkhoz; this sovkhaz gets 89 calves from every 100 cows, their survival being over 90 percent.

The farms in the rayon have noticeably specialized themselves in dairy and meat production in recent years. Last year Nikol'skiy Sovkhoz built a dairy



complex for 800 cows, Shchelkunskiy Sovkhoz started construction of a complex intended to raise 6,000 replacement calves, and Kolkhoz imeni Ya. M. Sverdlov built a replacement stock complex with a capacity of 1,060 calves and completed the plans for construction of a dairy complex with a capacity of 1,960 cows.

During the winter the farm specialists devoted serious attention to the quality of the feed and to analyzing blood serum from productive animals for calcium, phosphorus, carotene, and reserve alkalinity. The analyses made it possible to compensate for a lack of nutrients in the rations in time. Thus the latter were supplemented with micro- and macroelements, protein-containing feeds, and premixed feeds. Shchelkunskiy Sovkhoz assimilated production of AKD (amidoconcentrate additive), use of which had a favorable effect not only on the nutritional value of the ration but also on the concentration of fat in milk from the cows. Presently the AKD shop is supplying its products to all farms in the rayon.

The rayon's veterinary workers are displaying great concern for newborn young. They make sure that calving buildings are used effectively, they monitor the state of the air environment in veterinary dispensaries and calf houses, they teach the techniques of labor assistance to the farm workers, and they explain how to feed colostrum to calves. They make broad use of glucose-saline solutions, Sharabrin-fodkopayev liquid, gastric juice and lysozyme, nonspecific gamma-globulins, and herb tinctures for therapeutic and preventive purposes.

Physician V. N. Gorshkov has headed the veterinary service of Borodulinskiy Sovkhoz for over 10 years. Efficient interaction in the work of the specialists means 100 percent survival of the cattle, and sale of only top grade milk to the state. All livestock buildings in the sovkhov are fenced off, and they are outfitted with standard medical checkpoints; sanitation is well maintained in the buildings and the farm territory.

Cattlemen of Shchelkunskiy Sovkhoz are attaining indices that are just as high. Their attainment is being actively promoted by a friendly collective of veterinary specialists headed by physician V. I. Yuklyayevskikh.

Laborers of Pyshminskiy Rayon did a great deal of work to prepare for winter stall maintenance of the animals. They helped to procure a sufficient quantity of coarse, succulent, and concentrated feeds, set up five feed shops for work, and organize repair, disinfection, and whitewashing of the livestock buildings.

Veterinary workers are subjecting the animals at the farm to obstetric and gynecological examination, they are organizing animal insemination records, and they are maintaining data sheets on the physiological condition of the animals. Prompt pregnancy testing and effective organization of therapeutic and preventive work are producing good results. The rayon's farms have been receiving 85-90 calves from every 100 cows each year, and the number of barren cows is decreasing.



The best farms of the rayon include Chetkarinskiy Sovkhoz (senior veterinarian, L. A. Sergeyev), which produces pork and milk, Pyshminskoye Experimental Model Farm of the Ural Scientific Research Institute of Agriculture (N. S. Val'kov), where the cattlemen get more than 4,000 kg of milk from every cow, and the kolkhozes imeni S. M. Kirov and S. M. Budennyi.

Workers of Pyshminskiy Rayon feel that obtaining milk of good quality is one of their important tasks. All of the necessary conditions have been created at the dairy farms for this purpose: Milkmaids have been supplied with special clothing and with washing and disinfecting resources; the animal buildings are outfitted with areas for washing and storing milk containers, and with Freon milk refrigerators. Each month all of the cows are examined for latent mastitis. All of this has permitted the farm workers to sell 90 percent top grade milk to the state. Pyshminskiy Rayon has confidently held one of the first places in the oblast for a number of years in relation to the quality of livestock products.

It was a hard winter this year. The laborers of Sverdlovskaya Oblast had to contribute a great deal of selfless labor to surmount the consequences of severe frosts and deep snowdrifts. Having endured all of the difficulties honorably, the oblast's veterinary specialists and cattlemen are now successfully readjusting their work for the spring schedule.

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## VETERINARY MEDICINE

### COOPERATIVE EFFORTS CURB BRUCELLOSIS IN PRIMORSKIY KRAY

Moscow VETERINARIYA in Russian No 4, 1979 pp 6-8

[Article by Veterinary Division Chief M. F. Omel'chenko and N. M. Potapov]

[Text] Veterinary workers of Primorskiy Kray are waging an offensive battle against animal brucellosis. Just in the last few years the number of stricken points has been reduced by more than 10 times, and animal morbidity has been decreased by six times. This success is much a product of the labor contributed by veterinary specialists of Ussuriyskiy (chief veterinarian, P. I. Markevich), Mikhaylovskiy (chief veterinarian, A. A. Tupitsyn), and Oktyabr'skiy rayons (chief veterinarian, V. G. Zaytsev).

Colleagues of the epizootological division of the Primorsk Veterinary Scientific Research Station are providing considerable assistance to practical workers. They coordinate the topics of their research (the effectiveness of antibrucellosis measures, and the reaction inducing capability and activity of vaccine made from strain 82) with the requirements and requests of farm veterinarians. In their routine work they make broad use of the advice of scientists concerning the use of vaccine, diagnosis of diseases, and organization and implementation of preventive measures.

Vaccine made from strain 19 did not produce the desired impact in the fight against brucellosis. In some years, as many new stricken points were revealed as were cured. The low effectiveness of antibrucellosis measures can be explained by the practice of keeping sick animals at the farms for too long a time, and by laxities both in administrative and organizational functions and in implementation of veterinary measures.

An analysis of the epizootological data showed that growth in morbidity depends directly on the number of sick animals permitted to remain at the farms. Importation of the disease agents into disease-free farms was promoted by poor sanitary conditions at the dairy plants, which was true in Khankayskiy and Pogranichnyy rayons.

Difficulties in disease diagnosis associated with immunobiological alteration of the body also made the fight against brucellosis more difficult. Even at farms which had never used antibrucellosis vaccines, all of the sick animals

could not be detected by serological tests. Often, especially at the beginning, the disease progressed without clearly expressed signs. Here is an example. In March 1972 519 cows at a farm in the village of Priluki were given the agglutination test. Among them, 14 were found to be carrying titers of 1:50 and three had a titer of 1:100, a condition evaluated by two crosses. When ten cows were subjected to repeat examination, the agglutination test became negative for three, while for two the titer increased from 1:50 to 1:100 and for one it increased from 1:100 to 1:200. In all cases, however, the reaction was weakly expressed, the precipitate was loose and easily broken up, and the CFR [complement fixation reaction] was negative.

Later during the year the animals were examined seven times; 3,200 blood serum samples were analyzed, and a positive CFR was noted in only one case.

During the year there were ten abortions at this farm; seven of the fetuses were subjected to bacteriological analysis. The disease agent could not be isolated until a year after positive serological reactions to brucellosis appeared.

An allergic test was used to confirm the epizootic situation at the farm. Brucine produced by the All-Union Institute of Experimental Veterinary Science was used as the diagnostic agent. In the first tests on the herd 36 percent of the 228 cows reacted positively to the allergen. The positively reacting animals were brought together into a separate herd.

A similar atypical course was observed at farms of the villages of Usachevo and Novodevitsa, and elsewhere. Further research showed that this atypical disease course was elicited by brucellosis agent existing in dissociated state (the R-form).

The kray's farms were typified by different epizootic characteristics in relation to brucellosis prior to the use of vaccine made from strain 82. In addition to disease-free farms, there were also those where the disease was widely encountered. Due to a careless attitude toward the work on the part of foremen at some of these farms, the animals in the herds were allowed to go on reproducing. Immunization of the animals with vaccine from strain 19 curtailed the infection and set the stage for a well organized system of antibrucellosis measures. But a negative group result could not be achieved in serological reactions in numerous tests performed over a period of 2-3 years in herds treated with this vaccine.

Considering that epizootic situation, it was decided to immunize cows in all the farms with vaccine made from strain 82. The immunizations were preceded by a considerable amount of preparations; seminars were organized locally for farm and rayon specialists. Operational report forms were developed as a means to monitor the course of immunizations. All of these steps made it possible to finish vaccinating the cows on schedule.

The situation at the farms was improved through systematic tests and removal of animals reacting to brucellosis from the herds. Active immunization was

employed when necessary. Concurrently with performing systematic tests in the herds undergoing treatment, a complex of measures was implemented to eliminate the agent from the environment and to improve the sanitary condition of the animal buildings. It was for this purpose that strict veterinary requirements were imposed at the farms, calving departments and veterinary dispensaries were organized, and ill animals were subjected to prompt isolation.

The work of treating and preventing brucellosis is going on in accordance with plans written up by veterinarians of the veterinary division with the participation of scientists of the Veterinary Scientific Research Station and approved by the kray executive committees. The methods and schedule of brucellosis control at the farms are established depending on the incidence and the course of the disease.

Stricken farms undergo certification each year with the purpose of determining the special measures that must be implemented in the kray. The certification commission hears reports from farm and rayon chief veterinarians concerning the measures they have been implementing. Its decisions serve as the guidelines for organizing preventive and other measures at farms.

We believe the principal measures of the antibrucellosis plans to be replacement of stricken herds, surveillance over formation of the herds and groups of animals, purchase of animals from the public, creation of good general veterinary and sanitary conditions at the farms, and eradication of disease agents in the environment.

Pasteurization of milk for not less than 30 minutes at 80-85°C is a method deserving of introduction into the kray's farms. In this method, following 20 seconds of heating at pasteurization points, instead of being cooled the milk is poured into another container and allowed to stand for 30 minutes. The same method is used by dairy industry enterprises to pasteurize the skim milk prior to its return to the farms.

Immunization of cows with vaccine made from strain 82 following immunization with vaccine from strain 19 was one of the antibrucellosis measures. We can now assert that no special complications were experienced in vaccinating the cows of these herds. Sporadic positive reactions to the agglutination test and the CFR were observed after 1-2 years. Brucellosis-induced abortions did not occur. Cow herds immunized by the two vaccines are being maintained separately, and they are being sent to the slaughterhouse as their productivity declines.

A decision of the kray executive committee has spelled out a system for vaccinating calves (once or twice) in the period up to 1980, to be instituted in the farms and rayons with a consideration for the past epizootic situation.

The dairy complexes have been supplied with animals immunized with strain 82 vaccine prior to insemination. Vaccination of adult cows is not permitted at the complexes.

The practical fight against brucellosis in Primorskiy Kray demonstrated that this disease can be eradicated through a complex of organizational, administrative, veterinary, and sanitary measures. The kray was successful because not only veterinary specialists but also agricultural agencies joined in the fight against infection.

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## VETERINARY MEDICINE

### PRIORITY PLACED ON BRUCELLOSIS CONTROL IN IRKUTSKAYA OBLAST

Moscow VETERINARIYA in Russian No 4, 1979 pp 8-9

[Article by T. Ye. Kakoulin, Veterinary Division Chief]

[Text] The farms of Irkutskaya Oblast began detecting brucellosis for the first time after importation of breeding animals. The disease agent spread due to uncontrolled movement of animals at the farms and unsatisfactory implementation of treatment measures in areas stricken by the disease. Brucellosis also affected pigs, deer, horses, and dogs.

Prior to use of vaccine made from strain 19, treatment of animal farms stricken with brucellosis basically boiled down to implementing veterinary measures. The principal methods were systematic serological and allergic tests followed by isolation or slaughter of reacting animals, and decontamination of environmental objects and animal products. However, such measures based on revealing and slaughtering sick animals and implementing general sanitary measures turned out to be ineffective. In 10 years (1946-1955) brucellosis was eradicated in this way from 49 points stricken with cattle brucellosis and 93 points suffering sheep brucellosis.

Beginning in 1955 the oblast's veterinarians began using vaccine made from strain 19 as part of the overall system of antibrucellosis measures. This vaccine was given to large numbers of animals in the very first years. Later, animals were vaccinated only with the permission of the veterinary division. Young animals 6-8 months old were immunized and heifers were revaccinated before mating until 1967. After this year the animals were immunized once at all stricken points as well as in places threatened by brucellosis infection and locations undergoing treatment.

Strain 19 vaccine helped to curtail infection in the breeding herds, to achieve a significant decline in the morbidity of young animals, and to cure most stricken points. Extensive immunization of animals in Irkutskaya Oblast was a necessary measure, and an effective one in epizootological respects. The number of stricken points decreased by nine times, morbidity dropped by ten times, the need for isolation wards was eliminated, and great successes were achieved in treating sheep farms.

Nevertheless extensive use of strain 19 vaccine failed to completely eradicate brucellosis, and in view of its agglutinogenic capacity the preparation masked the true epizootic condition of the herds and hindered implementation of treatment measures.

On recommendation of the RSFSR Ministry of Agriculture Main Veterinary Administration, beginning in October 1974 the oblast's veterinarians began using vaccine from weakly agglutinating strain 82 at farms stricken with brucellosis. First they immunized heifers up to 5 months of age prior to insemination, and the cows that had previously been immunized with strain 19 vaccine. Serological tests on immunized cows revealed an insignificant quantity of positively reacting animals (0.17-0.15 percent).

Three years of experience in using strain 82 vaccine demonstrated its effectiveness as a means of specific brucellosis prevention; the vaccine inhibits development of disease, although it does not curtail it completely.

The oblast regularly holds seminars and conferences on the work methods of the best section, point, farm, and laboratory veterinary specialists. The housekeeping plans foresee fencing off the farms, building sanitary checkpoints, decontamination points, and barriers, and repairing livestock buildings.

Implementation of this complex of measures has made it possible to stabilize the brucellosis situation in the oblast.

Farms of Tayshetskiy, Ust'-Udinskiy, Nizhneudinskiy, Bolshanskiy, Osinskiy, Usol'skiy, Nukutskiy, and Ekhirit-Bulagatskiy rayons have been completely cured of brucellosis in the last 10 years. The achievements of the oblast veterinary service would not have been imaginable without the daily effective help of party, soviet, and agricultural agencies. Brucellosis eradication questions were discussed many times at meetings of the oblast and rayon councils of peoples deputies. Disease eradication measures covering a period up to 1981 have been developed and approved.

Animals at stricken points will be replaced by healthy heifers immunized at an age of 5-6 months and revaccinated prior to insemination.

Colleagues of the brucellosis laboratory of the All-Union Institute of Experimental Veterinary Science of the Siberian Branch, All-Union Agricultural Academy imeni V. I. Lenin, are providing a great deal of methodological assistance to us.

A great contribution to brucellosis control has been made by veterinarians B. P. Ponomarev, A. K. Shcherbinina, N. N. Nazarova, A. V. Popov, R. I. Galkin, M. I. Krylov, and A. P. Kudryavtsev and, in more recent years, T. Ye. Kakoulin, I. N. Kazankov, P. V. Burdukovskiy, and many others.

D. P. Speranskiy, N. I. Lontsov, T. M. Kungurov, A. A. Kungurova, I. V. Ivanov, B. P. Petrov, V. G. Pen'ka, A. I. Tyurnev, and M. M. Kokorin are contributing a great deal of effort and energy to the final eradication of brucellosis from the farms.

Veterinary workers of Irkutskaya Oblast. are successfully completing their great, important tasks, among which they believe eradication of brucellosis to be the most important.

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## VETERINARY MEDICINE

### PREVENTION OF DISEASE IN PIGLETS

Moscow VETERINARIYA in Russian No 4, 1979 pp 10-13

[Articles by D. P. Ivanov, Belorussian SSR Scientific Research Institute of Experimental Veterinary Science, and by Chief Process Engineer O. T. Sidorenko and Chief Veterinarian L. S. Kutuzov, Borisovskiy Sovkhoz-Combine, Minskaya Oblast]

[Text] D. P. Ivanov

Concentration of large numbers of pigs in limited territory at complexes, the unique feeding and maintenance conditions, and the stress experienced by piglets removed from their mothers early pose new problems to veterinary specialists and science in relation to the pathology and prevention of diseases suffered by young pigs, and their maintenance.

While production excellence has improved in general at the industrial farms, the number of sick pigs--suckling pigs and weaned pigs--has increased. In this case diseases of the gastrointestinal tract are first in line in relation to frequency of occurrence, extent of occurrence, and magnitude of harm done. This can be explained by the fact that the conditions in which animals are maintained and fed at industrial farms have a negative influence on metabolism, on the quality and quantity of microorganisms both in the pigs themselves and inside the buildings, and on nonspecific and specific body resistance, which in the end has an effect on the health of young animals.

Now that flowline production methods, early weaning of piglets, and intense utilization of sows have been introduced, feeding has received priority significance in the prevention of not only noninfectious diseases but also those elicited by conditionally pathogenic microflora. A greater demand for nutritionally complete rations is one of the unique features of the pig body, explainable by the specific features of their digestion and unique pathways for synthesis of biologically active compounds.

The pig body has a limited capability for synthesizing amino acids and vitamins B, C, and K, and a limited vitamin A reserve. Pigs cannot utilize feed rich in cellulose, since large amounts of it reduce assimilability of amino acids.

The principal causes of metabolic disturbances in pigs include a shortage of proteins, carbohydrates, vitamins, and minerals, incorrect ratios of these substances in the ration, limitation of the diet to concentrates alone and excessive provision of concentrates, and poor-quality feed.

Piglets, meanwhile, are especially sensitive to a protein deficit when subjected to intensive raising methods. Their limited reserves and higher needs are causes of more-frequent manifestations of metabolic disorders.

But large complexes are not receiving enough nutritionally complete feed. Research showed that combined feed supplied to Borisovskiy Sovkhoz-Combine, Minskaya Oblast does not always satisfy veterinary requirements. The protein deficit was 38 percent in some lots. In all of 1977 its concentration was 17 percent below normal. Combined feed intended for piglets has been lacking fats, vitamin B<sub>12</sub>, calcium, phosphorus, and copper; concurrently some of the lots contained excessive quantities of iron, cobalt, zinc, and manganese. Mold spores were discovered in almost all samples analyzed, and some of the spores were toxic. Some lots exhibited high levels of bacterial contamination and contained an excessive quantity of table salt. Many lots of premixed feed were lacking in lysine, iron, manganese, vitamins A and E, antioxidants, and other components.

Research conducted by the metabolism laboratory of the BelNIIEV [Belorussian SSR Scientific Research Institute of Experimental Veterinary Science] showed that in different periods of pregnancy the blood of sows experiences a decline in the concentration of glucose, copper, and cobalt, the ratios of individual amino acids, calcium, and phosphorus are disturbed, and the urea concentration is high. These metabolic changes in the sow's body doubtlessly have an effect on the health of piglets. The phagocytic activity of leukocytes, the neutrophil index, the bactericidal activity of blood serum, and the lysozyme concentration were lower in sows producing piglets suffering dyspepsia than in animals producing healthy offspring.

Colleagues of the Belorussian SSR Scientific Research Institute of Animal Husbandry (Yu. S. Shkunova), BelNIIEV (G. E. Yermolayev), and specialists of the Borisovskiy combine (O. T. Sidorenko) suggest normalizing metabolism by changing the rations or altering the ratio of their ingredients. Certain aspects of sow metabolism can be regulated successfully by adding molasses to the ration. The concentration of glucose and glycogen became normal in the blood of animals receiving such a ration, and a number of glycolytic enzymatic processes became stable. Moreover molasses has a favorable effect on protein metabolism.

Specialists of Borisovskiy Sovkhoz-Combine and our institute's colleagues are devoting a great deal of attention to prevention of colibacteriosis. The most widespread serological group of *E. coli*, isolated through microbiological research, was used to prepare a formol vaccine, which was given to more than 14,500 pregnant sows and about 25,000 piglets from 7 to 10 days old. In addition to specific disease prevention, the complex devotes a great deal of attention to normalizing the maintenance and feeding conditions, to raising the resistance of newborn piglets, and to sanitizing the buildings.



The sovkhos is also successfully fighting edema in piglets. At the time of the complex's formation it was diagnosed in 20 percent of the young animals and was responsible for significant piglet losses. The complex's zootechnical and veterinary services took emergency steps. Working with colleagues of the Belorussian SSR Scientific Research Institute of Animal Husbandry they proposed and introduced a new combined feed recipe for weaned piglets containing a high cellulose concentration. Veterinary specialists V. I. Kapustin and L. S. Kutuzov organized veterinary measures and immunization of animals with colibacteriosis vaccine. Calcium chloride, hyperimmune serum, monomycin, vitamin B<sub>1</sub>, and dimedrol were used as well. The extensive therapeutic and preventive measures helped to eradicate the disease.

During the time of the combine's development pigs undergoing fattening and pigs in the breeding herd were also stricken with dysentery. This disease can be prevented dependably only if its etiology is established. Introduction of a technique for isolating (triponema) (one of the principal dysentery agents) was enough to induce good results in the use of (trikhopol). In addition to using medicinal agents to treat this disease, we must comply with the production procedures and veterinary requirements, maintain strict records on animals falling ill, and take steps to isolate them.

Not only natural but also specific resistance of pigs often declines at industrial complexes. The working experience of the Borisovskiy Combine showed that despite planned preventive measures against Aujeszky's disease, cases of immunity failures accompanied by major breakouts among weaned piglets and young piglets undergoing fattening are nevertheless observed. Immunity analysis revealed that it was low among pigs 6-8 months after vaccination against plague and 2-3 months after vaccination against Aujeszky's disease, even though according to the instructions for using vaccines against these diseases the animals are supposed to maintain their immunity for up to a year and longer.

The results of a special experiment on development of immunity against plague and Aujeszky's disease (A. S. Shashen'ko, N. A. Kovalev, V. I. Gevedze, A. S. Yastrebov, V. T. Sakovich) demonstrate that the schedule for vaccinating animals against these diseases must be reexamined at industrial complexes.

Now that we have made the transition to industrial pig raising, which entails the use of rapidly growing and swiftly maturing breeds of animals, the urgency of preventing diseases caused by microelement deficiencies has grown; this is particularly true of iron-deficiency anemia in piglets, which not only causes economic losses but also provokes other diseases caused by conditionally pathogenic microflora.

There are a number of good resources for preventing this disease today, iron being basic to all. For the moment we are also forced to employ drugs injected intramuscularly, but the future is best for preparations that are administered to the piglet (even better to the sow) together with the feed or water. Iron glycerophosphate is one such preparation. It has produced outstanding results in our experiments and in those of other researchers.

Presently the colleagues of BelNIIEV's laboratory of piglet diseases are improving the use of microelements, to include iron glycerophosphate, and they are developing granulated feed additives for piglets. Such feed additives have been tested at the Borisovskiy Combine and are producing good results. The job now is to organize their industrial production.

We are also working together with the collective of the Minsk Medical Preparations Plant to improve ferrodextran preparations administered parenterally. The new effective preparation mikroanemin has been tested. Once again, however, its extensive introduction will depend on organization of plant production.

Traditional methods and resources for preventing a number of diseases in young pigs do not always produce the expected result under industrial pig maintenance conditions. This is why we must strictly implement measures to protect the farms from importation of infectious disease agents, monitor the quality and use of combined feeds and the animal feeding schedule, regularly analyze the metabolic functions of pregnant and nursing sows, and strictly comply with the standard parameters for microclimate of and the quality of preparations made in buildings intended for piglet delivery and maintenance of newborn piglets.

We must also thoroughly study the gastrointestinal and respiratory diseases of piglets caused by conditionally pathogenic microflora with the goal of developing better methods for their diagnosis and prevention. We must improve the schemes, methods, and resources for preventing Aujeszky's disease, and tie in veterinary preventive measures with the production procedures.

O. T. Sidorenko, L. S. Kutuzov

Our sovkhos combine has reached its planned capacities in relation to most production indices. This was the result of work done by the entire collective and, to a considerable extent, by the complex's veterinary service.

During the time of the complex's operation a diligent collective of laborers and specialists evolved. V. V. Krupen', the chief veterinarian, enjoys deserved respect. Survival of weaned piglets in the section under his responsibility exceeds 98 percent. Veterinary processing operators S. V. Moroz and G. M. Mikhalyuk are enjoying good results in their work.

Feed and its quality are the foundation of the health and high productivity of the animals. This is why we are so greatly concerned about the quality of the combined feeds being produced for our farms. Colleagues of the BelNIIEV and other institutes are helping us to determine the concentration of the principal nutrients in the feeds, and of vitamins and microelements in premixed feeds. The complex's veterinary laboratory checks out the feed for toxicity, bacterial infestation, and the table salt and protein concentration.

It takes a great deal of work to keep piglets healthy in the first two weeks after weaning. According to our observations feeding SK-11 nutritionally complete combined feed, which contains little cellulose and large quantities of readily assimilated carbohydrates, creates favorable conditions for development of hemolytic *E. coli* strains in the digestive tract of piglets.

The problem of isolating and treating sick piglets in separate pens is compounded by high cost and high consumption of medicinal preparations. This gave us the idea of developing a recipe for a nutritionally complete combined feed that would inhibit development of hemolytic *E. coli* serotypes in the digestive tract. We added 10 percent grass meal to an experimental lot of combined feed. The nutritionally complete combined feed, which was developed with the assistance of scientists, reduced animal morbidity. The annual savings enjoyed from its introduction into production was over 200,000 rubles in 1977.

A weaned piglet feeding schedule foreseeing precise feed doses has been developed at the combine. It has undergone production tests and received the approval of both specialists and operators in the piglet raising section.

We make extensive use of vitamin preparations to raise body resistance. Vitamin-enriched fish fat is added to the feed of boars and sows. Three-ingredient vitamin is injected into sows in the first days following insemination as well as 30 and 15 days prior to delivery; for a month prior to delivery they are given furazolidone and sulfur orally each day (250 and 200 gm per ton of combined feed).

This is a dependable way to prevent colibacteriosis in suckling piglets.

The health of pregnant sows is kept under constant observation. Compliance with farrow hygiene is a guarantee of healthy offspring. Sows may experience constipation prior to farrowing and in the first days after it. This makes delivery difficult and may cause agalactia. This is why we give Glauber's salt (50-100 gm) to sows together with feed. On being transferred to the sector prepared for farrowing, the sows are washed with warm water and irrigated with SK-9 solution. When farrowing begins the operator turns on a heating lamp and pours clean, dry wood shavings beneath the sow's rear end. As the piglets appear he wipes them with clean shavings and places them beneath the heating lamp, and he observes the successfulness with which the piglets suckle.

At birth and stillborn piglets are collected in a galvanized covered barrel and removed to a specially designated place. Later the canine teeth of the piglets are sheared off, and their tails are amputated. Concurrently, to prevent diarrhea they are given 10-15 mm 1-2 percent citric acid or iodinol. With the same objective, the piglets are given xeroform in a starch suspension on the second day, ferrodextran is infused on the third day, and boars are castrated on the 10th-12th days.

We studied the effectiveness of treating endometritis with bicillin, streptomycin, oxytocin and vitamin E. Forty percent of the animals recover after a single injection of these preparations, and all sick animals recover after four injections, which indicated that these drugs have a high therapeutic effectiveness.

Colibacteriosis is extremely dangerous in piglets, especially in the first week of life. One of the causes of the disease is importation of young sows from other farms. In our opinion the most effective way to prevent this disease in large complexes would be to vaccinate all pregnant sows.

Compliance with all sanitary requirements concerning preparation of freed sectors and pens for further use is an important step in prevention of animal diseases at the complex. Our laboratory is responsible for certifying their readiness to receive new animals.

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DISALAN TOXICOLOGY

MOSCOW VETERINARIYA in Russian No 4, 1979 pp 56-58

[Article by B. A. Timofeyev, V. N. Savel'yev, and V. Sh. Poluektov, VGNKI, A. V. Akulov, All-Union Institute of Experimental Veterinary Science, and V. A. Makarov and V. M. Kondratenko, Moscow Veterinary Academy]

[Text] Disalan, a rafoxanide synthesized at the VGNKI (All-Union State Institute of Scientific Control), is highly effective against fascioliasis in cattle and farm animals (L. P. Khitenkova, V. B. Piskov, V. Sh. Poluektov, 1976; B. A. Timofeyev, V. N. Savel'yev, et al., 1977). We studied its toxicity on 28 similar calves (16-18 months old) divided into four groups (of seven head each). Disalan was administered internally in the form of an aqueous suspension: Group 1 was given 15 mg/kg body weight (therapeutic dose), group 2 was given 225 mg/kg (15 times more), group 3 was given 450 mg/kg (30 times greater than the therapeutic dose), and animals of group 4 did not receive the preparation (control).

Blood was sampled for biochemical analysis from the animals prior to administration of the preparation, 6 and 24 hours after its administration, and then on the 3d, 6th, 14th, and 20th days. We determined total protein (refractometrically) the urea concentration by Gasanov's method (1961), total cholesterol by Rozentsveyg's method (1962), and blood serum cholinesterase activity using the method described by Pokrovskiy et al. (1961); we established hematological characteristics (hemoglobin, erythrocytes, leukocytes) and proteins in urine (nitric acid test), and we noted the overall clinical condition of the calves. Three days after administering disalan we slaughtered three calves each in the first, second, and control groups to determine meat quality, and 3 and 20 days after the drug's administration we slaughtered three calves in each group for pathomorphological analysis.

We established that the erythrocyte and leukocyte counts varied insignificantly.

The hemoglobin concentration of calves in group 1 decreased by the 6th-7th day by 10.3 percent, in group 2 by 9.1 percent, and in group 3 by 13.6 percent. By the 14th day its level returned to the initial values for calves in groups 1 and 3, while in group 2 it remained below the initial level throughout the entire period of observation.



Analysis of the cholesterol concentration revealed that it varied in all calves; however, all fluctuations were within physiological normal. The urea level in calves of group 1 dropped by 44 percent after 6 hours, increased after 24 hours, then it decreased by the 2nd day, and by the 20th day it dropped to 39.9 percent (in comparison with the initial level). The quantity of urea did not vary sharply in calves of group 2. Its concentration in animals of group 3 doubled after 3 days and decreased somewhat after 6; it fluctuated within insignificant limits in the control group. The total protein level in group 1 increased by 4.1 percent after 3 hours, dropped to normal after 24 hours, and remained 7.9 percent low from the 3rd to the 20th days. The total protein concentration increased in group 2 to 3 percent by the 20th day. It was noted to decline gradually in group 3, the greatest decline occurring after 6 days (25 percent).

Inhibition of total cholinesterase activity by 39.8 percent was noted in group 1 after 3 days; subsequently its level returned to normal. The activity of nonspecific cholinesterase varied insignificantly, while that of specific cholinesterase increased by 21 percent in just 24 hours, dropped by 31.6 percent after 3 days, and then returned to its initial level. The greatest inhibition of the activity of total cholinesterase was observed in group 2 after 6 days (15.6 percent), after which it returned to its initial values. Significant fluctuations were not noted in nonspecific and specific cholinesterase activity for this group. Maximum total cholinesterase activity was inhibited (by 28.1 percent) after 3 days in group 3, after which it returned to normal and then declined by 19.3 percent on the 30th day. In the control group it was inhibited by 27.8 percent after 24 hours. Variation in the activity of nonspecific and specific cholinesterase was insignificant. Analysis for presence of protein in urine produced negative results in the period of observation.

The results of meat quality analysis are presented in the table below.

Biochemical Characteristics of Beef on  
the 3rd Day Following Disalan Administration

(1) Доза (мг/кг)	(2) Образцы мяса	(3) pH	(4) Реакция на пероксидазу	(5) Амино-зла- кислотный азот (мг)	(6) Летучие и жирные кис- лоты (мл)	(7) Коэффициент кислотности- окисляемости	(8) Формоль- ная реак- ция
15	17	5.6	Положи- тельная	1.03	0.13	0.60	Отрица- тельная
	18	5.4	"	1.09	0.16	0.76	"
	20	5.6	"	0.88	0.16	0.66	"
225	1	5.8	"	0.86	0.14	0.77	"
	2*	5.6	"	1.26	0.16	0.74	"
	3	5.7	"	1.26	0.15	0.73	"
(10) Контроль	30	5.8	"	0.96	0.17	0.70	"
	31	5.7	"	1.03	0.16	0.68	"
	32	5.8	"	1.02	0.14	0.68	"

[key on following page]

Key:

- |                                  |                                 |
|----------------------------------|---------------------------------|
| 1. Dose (mg/kg)                  | 6. Acidity-oxidizability factor |
| 2. Meat samples                  | 7. Formol reaction              |
| 3. Peroxidase reaction           | 8. Positive                     |
| 4. Amino-ammonium nitrogen (mg)  | 9. Negative                     |
| 5. Volatile and fatty acids (ml) | 10. Control                     |

The data indicate that at dose of 15 and 225 mg/kg disalan does not alter meat quality. Pathomorphological and histological analyses established that the preparation did not elicit any sort of pronounced changes in calves at the indicated doses.

Because liver flukes parasitized the liver and because the latter's function depends significantly upon joint, regulated activity of enzyme systems, we made it our objective to determine the liver's functional state as indicated by the activity of enzyme systems and expressiveness of the proteosynthetic capacity, and fluctuations in the amount of urea and cholesterol in blood serum in response to administration of disalan.

Cholesterol biosynthesis occurs in the animal body in the liver, where it participates in formation of bile acids and other biological products; disturbance of its metabolism leads to atherosclerosis, gallstone disease, and other pathological states.

Our experiments show that judging from the blood cholesterol concentration, the homeostatic function of the liver is not disturbed by administration of disalan.

We established that when the function of the liver is disturbed (for example in response to phosphorus poisoning) the urea quantity decreases dramatically. The variations in urea level observed among experimental calves were similar to those of control calves, with the exception of group 3 where it decreased by a factor of two ( $P < 0.05$ ), and consequently these variations are not an effect of disalan.

We know that proteins are formed in the liver, and that disturbance of this function leads to a decrease in the activity of enzyme systems (S. G. Aptekar', 1973). Analysis of total protein in the blood serum of the animals indicates that it is correlated with cholinesterase activity. In particular we noted insignificant simultaneous decreases in the level of total protein in blood serum and of total and specific cholinesterase in animals of group 1 by the 3 d day, these decreases being 6.5, 32.8, and 12.5 percent respectively; in animals of group 3, the concentration of the first decreased in 3 days by 24 percent, that of the second decreased by 28.1 percent, and that of the third decreased by 16.7 percent.

A number of toxicological premises must be considered when analyzing the significance of these fluctuations and their adequacy to the toxic action

of disalan. The threshold of the substance's toxic action is defined as the minimum concentration (or dose) eliciting changes in the body characterized by the following signs: The changes differ significantly ( $P < 0.05$ ) from control and are beyond (by more than 2σ) physiological variations of the characteristics for the given species of animals and the time of year; there are no significant ( $P < 0.05$ ) changes in comparison with control, and latent disturbances of equilibrium with the external environment (reduction of adaptive possibilities) are observed, being revealed in particular with the help of functional and extreme loads (the reaction is  $\pm 2\sigma$  outside the limits of the corresponding norm); changes differ significantly ( $P < 0.005$ ) from control, but at the same time they are within physiological normal, though they do persist stably (for more than a month in animal experiments--I. V. Sanotskiy, I. L. Ulanova, 1975).

Practical application of these rules demonstrated that in many cases "physiological normal" is subject to significant seasonal and even daily variations.

A comparison of variations in the biochemical characteristics with these requirements leads to the conclusion that cattle tolerate disalan well at the doses employed in our experiments.

Fluctuations in urea in experimental calves corresponded to fluctuations in control animals, though in a number of cases they did go beyond normal. Nevertheless these reactions can be interpreted as true adaptive processes.

#### Conclusions

1. Disalan is tolerated well by animals and does not influence functional activity of the liver (the cholesterol and urea levels vary insignificantly, and the liver's proteosynthetic function and its enzymatic activity are not inhibited) at doses of 15 (therapeutic) and 225 mg/kg body weight.
2. At doses of 15 and 225 mg/kg body weight, disalan does not influence the quality of meat from slaughtered animals, while at a dose of 445 mg/kg it increases the concentration of urea in blood serum ( $P < 0.05$ ).

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DEPENDENCE OF PIG RESISTANCE AND PRODUCTIVITY ON BUILDING TEMPERATURE

Moscow VETERINARIYA in Russian No 4, 1979 pp 18-20

[Article by F. G. Torpakov, All-Union Institute of Experimental Veterinary Science]

[Text] The industrial pig raising complex at the Sovkhoz imeni 50-letiya SSR, Moscow Oblast and others built on the basis of experimental plans drawn up by the All-Union Planning and Scientific Research Institute for the Planning of Standard Experimental Agricultural Production Centers and Grain Storing and Processing Enterprises are huge enterprises intended for reproduction, raising, and fattening of 108,000 pigs per year.

A typical feature of these complexes is the high degree of mechanization and automation of all production processes, to include those involved in maintaining a controlled microclimate, year-round reproduction, flowline production processes, and maintenance of pigs on concrete floors without the use of pastures or litter.

The pig raising complexes foresee highly intense animal use: 2-2.5 pregnancies per sow, 20-22.5 piglets per sow per year, weaning at 26 days old, a gilt weight of 38 kg at the time of transition to fattening (at an age of 105 days), and a pig weight of 112 kg at an age of 7.5 months.

Maintenance of pigs in these conditions has an influence on their physiological condition and their body resistance (N. M. Komarov, F. G. Torpakov, U. M. Markov, N. V. Chernyy, S. P. Kuz'min). Building microclimate has great significance among factors governing the optimum course of physiological processes and influencing pig body resistance. My research and the work of other authors (I. I. Khokhlova, N. V. Chernyy, and others) showed that low and high air temperatures have an unfavorable effect on the animal body.

The air temperature maintained in pig fattening buildings in accordance with the accepted production practices was found to be greater than the level recommended by domestic norms. It became necessary for this reason to experimentally test the action of high temperature on the pig body.

The work was done in the winter-spring period at the pig raising complex of Sovkhoz imeni 50-Letiye SSR in Moscow Oblast. Two experiments with the same experimental design were performed.

Pigs weighing an average of 36 kg were kept under observation in two identical isolated sections of the building. There were 600 animals in each section (25 per pen). Twenty animals of identical body weight, age, and sex were selected from both sections for determination of physiological characteristics and weight gain. Each experiment lasted 4 months. The animals were fed and maintained under identical conditions.

An air conditioning system and heat sensors were used to keep the air temperature at 20° in the experimental section during the time of the experiment. The temperature in the control section was kept at 18° during the first fattening period (up to an animal age of 160 days) and at 16° in the second and final period. The air circulation rate was kept identical in both sections-- 40-20 m<sup>3</sup>/hr in winter and 70-60 m<sup>3</sup>/hr in spring.

Temperature and humidity in the zone in which the animals were located were monitored by heat sensors and measured with an aspirational psychrometer; thermographs and hydrographs were used as well. Once every 10 days other characteristics of the air environment were determined at the same point (concentration of carbon dioxide and ammonium air circulation rate, air cooling intensity, microbial contamination). Floor temperature in the pens was measured also.

In order to permit evaluation of the physiological condition and body resistance of the pigs, blood was analyzed in the preexperimental period and every 15 days for neutrophil phagocytic activity and the concentration of hemoglobin, total protein, and protein fractions by the commonly accepted techniques. Erythrocyte and leukocyte counts were taken. Blood serum was analyzed for bactericidal and lysozyme activity and for the titer of agglutinins against swine fever agent (using vaccine made from strain VR-2). The body and skin temperatures of the animals were measured, pulse and respiratory movements were counted, and the degree of hide contamination was determined. Constant records were kept of the numbers of sick animals, and the nature of disease was spelled out. At the end of the experiment 450 of the animals were slaughtered at a meat packing plant, and their internal organs were examined.

The research results are as follows.

Prior to the experiment the microclimate characteristics were the same for both sections. Significant differences were not noted in the clinical physiological characteristics describing animal resistance. This was evidence that the groups of animals had been selected correctly.

A difference in cooling effect was noted during the experiment in connection with changes made in the air temperature of the building, as foreseen by the experimental design. In particular the cooling intensity of air in the experimental building was 6.5 mcal/cm<sup>2</sup>/sec, and it was 7.8 ± 0.09 mcal/cm<sup>2</sup>/sec in the control building.



The difference in the cooling effect caused changes in the physiological condition in the animals. Thus the skin temperature of control pigs was  $30.6 \pm 1^\circ$ , the number of respiratory movements was  $21 \pm 1.4$  per minute, pulse was 70.1, and heat transfer from the body was  $61.8 \pm 1.2$  kcal/m<sup>2</sup>/hr; for the experimental animals these characteristics were  $32.8 \pm 0.2$ ,  $30.0 \pm 0.7$ , and  $81.0 \pm 0.6$  respectively. It was noted that in comparison with control animals, the experimental animals exhibited heat exchange of greater intensity. Evidence of this was also found in the behavior of the animals. Typically the behavior of experimental and control animals did not differ in the first 2 months. However, after a body weight of 60-70 kg was attained a significant difference could be seen. The behavior of experimental animals changed noticeably. In the times between feedings the pigs lay down separately, they took up all of the floor of the pen, and they often even spilled over onto the grating over the manure storage bin. The control animals in the building with the lower temperature lay down closer together to rest, they occupied only two thirds of the pen floor, and they never occupied the grated part of the floor.

Hematological characteristics describing the resistance of the pigs did not differ significantly in the preparatory period, when they were maintained under the same conditions.

Data from analyses of blood samples of animals in buildings experiencing different temperature conditions during the experiment are shown in Table 1.

Table 1. Hematological Characteristics of Pigs Maintained in Buildings Experiencing Different Temperature Conditions

(1) Показатель	(2) Группа животных		(5) Достоверность различий (P)
	(3) опытная	(4) контрольная	
(2) Фагоцитарный индекс нейтрофилов	$10.3 \pm 0.1$	$9.8 \pm 0.1$	$P < 0.05$
(3) Бактерицидная активность (%)	$89.2 \pm 0.3$	$86.0 \pm 0.8$	$P = 0.02$
(4) Лизоцимная активность (%)	$50.7 \pm 0.3$	$43.9 \pm 0.1$	$P = 0.02$
(5) Лактатон общий (mg%)	$24.3 \pm 0.4$	$21.4 \pm 0.4$	$P < 0.05$
(6) Гемоглобин (gm%)	$11.0 \pm 0.1$	$10.3 \pm 0.1$	$P > 0.05$
(7) Общий белок (gm%)	$7.04 \pm 0.4$	$6.2 \pm 0.2$	$P < 0.05$
(8) Глобулины (gm%)	$4.36 \pm 0.2$	$3.45 \pm 0.4$	$P < 0.05$
(9) Гамма-глобулиновая фракция (gm%)	$1.53 \pm 0.1$	$1.17 \pm 0.07$	$P < 0.05$

Key:

- |                                |                                    |
|--------------------------------|------------------------------------|
| 1. Characteristic              | 8. Lysozyme activity (%)           |
| 2. Animal Group                | 9. Total glutathione (mg-%)        |
| 3. Experimental                | 10. Hemoglobin (gm-%)              |
| 4. Control                     | 11. Total protein (gm-%)           |
| 5. Group significance level    | 12. Globulins (gm-%)               |
| 6. Neutrophil phagocytic index | 13. Gamma-globulin fraction (gm-%) |
| 7. Bactericidal activity (%)   |                                    |

Table 2. Pig Morbidity, Survival, and Weight Gain Data

(1) Помещение	(2) Количество животных				(7) Среднесу- точный прирост (г)	(8) Достовер- ность
	(3) заболело		(6) погибло и вынуждено убито			
	число (4)	процент (5)	число (4)	процент (5)		
(9) Контрольное	47	7.3	12	2.3	517 ± 8	P < 0.05
(10) Опытное	68	10.6	35	3.9	504 ± 1	

Key:

- |                      |  |
|----------------------|--|
| 1. Building          | 6. Dying and subjected to forced slaughter |
| 2. Number of animals | 7. Average daily weight gain (gm)          |
| 3. Falling sick      | 8. Significance                            |
| 4. Number            | 9. Control                                 |
| 5. %                 | 10. Experimental                           |

The data in Table 1 attest to changes in animal physiological functions in connection with the different temperatures maintained in the buildings. The physiological characteristics of control pigs in the building with the low temperature were higher than those of experimental pigs. Differences were established in relation to many characteristics with the exception of hemoglobin. The blood serum agglutinin titer was higher for the control animals. In particular the reaction intensity in serum samples diluted to 1:25 were 3-4 crosses for control animals and 2-3 crosses for experimental animals.

These data indicate that throughout the entire fattening time, the resistance characteristics of pigs maintained at low temperature were higher than those of animals kept in the building with the higher temperature.

This is also confirmed by animal morbidity, survival, and weight gain data (Table 2).

We can see from Table 2 that animal morbidity was 3.3% lower in the control building while daily weight gain was 3% higher.

Economic computations showed the maintenance of control animals was the most effective. In particular the cost of 1 centner of weight gain in this group was 72.5 rubles, as opposed to 75.1 rubles for the experimental group--that is, 1 centner of pork was 2.6 rubles cheaper. Pigs in the control building were sold for meat at a price 2,500 rubles greater than the price of the experimental animals, which corresponded to 2,300 rubles more profit. Hence the profitability is 2.6% higher.

#### Conclusion

An air temperature of 18° is most in keeping with the physiological needs of the animal body of pigs undergoing their first fattening period in buildings of an industrial pig raising complex; the best temperature in the second fattening

period is 16°. When such temperatures are maintained, the animals remain more resistant to diseases, their productivity rises, and the profitability of pork production increases.

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ACHIEVEMENTS AND PROBLEMS OF VETERINARY VIROLOGY

Moscow VETERINARIYA in Russian No 4, 1979 pp 26-28

[Article by V. N. Syurin, Moscow Veterinary Academy]

[Text] Every new research method discovered and introduced has provided a new impetus to the development of virology. Our ideas about viruses underwent significant changes in the last half century.

Filterability has lost its absolute value as a distinguishing criterion (filterable bacteria have been discovered). The criterion of obligate parasitism has experienced significant evolution (it is a characteristic of the Chlamydozoa and *Rickettsia*, as well as of *Plasmodium* and *Toxoplasma*). At the genetic level parasitism was found to be a derivative rather than primary property of viruses. The notion that viruses are devoid of their own enzymes has been discarded. All presently known viruses have their own highly specific replication enzymes, either within the structure of the virion (forward and reverse transcriptases) or encoded in the viral genome. The criterion that all viruses contain one of two nucleic acids--DNA or RNA--is no longer universal. It is valid in relation to extracellular mature virions; however, information RNA is necessarily synthesized during reproduction of DNA-containing viruses. In this case cellular enzymes are responsible for DNA transcription in some viruses (the adenoviruses), while the virions of others (smallpox viruses) contain their own highly specific transcriptases.

Our ideas about virus reproduction changed. It was found that replication of their genetic material has traits in common with the doubling phase of cell genetic material.

The one property today that distinguishes viruses from all other known living forms is absence of their own protein synthesizing systems.

The methods of molecular biology have revealed the mechanism of protein biosynthesis, which follows a DNA-RNA-protein pattern, the role of ribosomes as the machine tools of protein synthesis, and the role of transfer RNA as carrier of amino acid residues.

Our knowledge of the interaction between structure and function in animal viruses deepened. Typical of complex viruses is presence, in their virions, of structural viral proteins exhibiting enzymatic activity, to include neuraminidase and RNA-polymerase in myxoviruses, DNA-dependent RNA-polymerase in smallpox vaccine virus, and RNA-dependent DNA-polymerase (reverse transcriptase) in RNA-containing oncogenic viruses (oncornoviruses). Owing to the presence of these and other proteins (hemagglutinins, hemolysins, and so on) their virions assume additional functions absent from the simple viruses (elution of influenza virus due to operation of the enzyme neuraminidase, and so on).

New data have been acquired on the structure and function of viral nucleic acids and proteins. The universality of the genetic role of viral DNA and RNA is commonly recognized; however, this role is performed differently in DNA and RNA containing viruses. In the former, as with higher organisms, the genetic and metabolic functions are separate: Virion DNA performs genetic functions while specific information RNA performs metabolic functions. In the latter both of these functions are performed by viral RNA, synthesis of daughter molecules of virus-specific RNA proceeds with viral RNA as the template, and it also performs the function of information RNA, serving as the template for synthesis of virus-specific proteins.

The essence of genome transcription and translation of viral templates has been decoded in many respects. Data presently accumulated on the ontogenesis of most DNA and RNA containing viruses show that their reproduction is basically characterized by the following chain of processes. The initial (preparatory) period: adsorption of viral particles onto the cell surface; penetration into the cell; deproteinization of viral nucleic acid. The middle (latent) period: synthesis of early proteins (suppressing normal cell metabolism and supporting biosynthesis of viral progeny); synthesis of viral components (replication of viral nucleic acids, formation of structural viral proteins). The final period: formation of virions; release of progeny. Viral polymerases of three types (DNA-RNA, RNA-RNA, RNA-DNA) defining the nature of transcription of viral genomes have been discovered and studied.

The problem of viral genetics is vast and poorly studied. The most pressing problems are those concerning the mechanisms and specificity of induced mutagenesis; the mechanisms of repair of genetic damage; searching for highly active mutagens and increasing the effectiveness of their action; determining the most dependable labels to be used in selection and control of vaccine strains, on the basis of a thorough study of the mutual relationships among genetic characteristics.

Problems concerning genetic interaction of different viruses are now attracting attention. When joint reproduction occurs as a result of an exchange of genetic material, different types of genetic interactions are possible--hybridization, multiple and cross reactivation, heterozygosity, transcap- sidation. Transcapsidation induced between foot and mouth disease virus and



cattle enteroviruses is especially interesting. We may also observe non-genetic reactivation, complementation, interference and stimulation. Analyses of the structural proteins of influenza virus and of the recombination mechanisms of this virus place a different interpretation upon arising of variants of this virus causing epidemics and pandemics. Important data have been acquired on interspecific recombination of human and animal (bird, pig, horse) influenza viruses.

One of the important problems of viral genetics is that of the causes behind hereditary alterations. According to today's ideas the mutation mechanism boils down to change in sequence of nucleotide pairs in the nucleic acid molecule; to simple or complex substitution of one or several pairs of bases; to deletion from or insertion of one or several pairs of bases in the nucleic acid molecule.

The problem of mutagenesis specificity requires deep research on the mutagen mechanism of action at the nucleotide level.

Viral ecology is acquiring important significance. It would be important in theoretical respects to reveal the sort of situations in which chronic and latent infection play a role in viral survival in the interepizootic period. Little is yet known about the causes behind transition of chronic and latent forms of infection into clinical ones, or about the role of stress factors, weather changes, and changes in population genetics in this transition. An epizootic wave arises, develops, and recedes, this being a manifestation of differences in the nature of the mutual relationships existing between the disease agent and the susceptible host. In order that we can study the mutual relationships between agent populations and populations of susceptible hosts, we would have to conduct massive serological surveys. Application of the same methods has special significance in this work; this can be achieved by universal use of centrally manufactured dry diagnostic kits.

Another very important problem is that of determining the possible ways a disease agent is imported into disease-free territory, where the complex of abiotic factors promotes creation of an independent population. In particular, migrating birds may be responsible for this, and in this aspect the latter demand close inspection.

The time many viruses remain (persist) both in the body and in cells and tissues (cultured outside the body) has been established.

Both vertical and horizontal virus transmission lie at the basis of the pathogenesis of persistent infections. Among the known mechanisms of persistence we can include integrative forms of interaction between cell and viral genomes, typical of oncogenic and some other infectious viruses. Some representatives of the herpes viruses may elicit infectious and neoplastic processes (common herpes virus, Epstein-Barr virus).

One of the most important problems of general virology is that of developing new principles of creating inactivated antiviral vaccines. The infectious

properties of a virus are the product of its nucleic acids, while antigenic properties are the product of proteins and polysaccharides. Naturally the methods of virus inactivation must be based on reactions that dependably alter nucleic acids and have a minimum effect on proteins. Besides an inactivating action, chemical agents must stabilize the antigenic mosaic inherent to the virus. Also deserving of attention is the problem of adjuvants, which prolong the specific postvaccinational resistance of immunized animals.

The problems of immunopathology also require solution. The immune response to a number of viral infections (equine infectious anemia, African swine fever, Aleutian mink disease, lymphocytic choriomeningitis, and so on) is accompanied by injury to the body. Interaction of antibodies with sensitized lymphocytes results not in recovery and sterilization of the organism but rather in pathological development. Immunopathological mechanisms play the principal role in the pathogenesis of these diseases. The autoimmune mechanism expresses itself as formation of hypersensitivity to the body's own tissue components. So-called immune complexes form; at first they are deposited along the basal membrane of vessels, and then tissue injuries develop. A weak immune response to chronic forms of viral infections creates favorable conditions for formation of virus-antibody aggregates and makes it practically impossible to create dependable ways to specifically prevent such infections.

As far as the applied problems of veterinary virology are concerned, among them we can include viral pneumoenteritis of young agricultural animals, Newcastle disease, Marek's disease, and infectious laryngotracheitis in birds, transmissible gastroenteritis in pigs, infectious anemia in horses, and many others. Much research has been conducted on these infections in recent years, but many problems still remain unclear, especially those pertaining to immunology and immunopathology, without an understanding of which it would be impossible to develop effective control and prevention.

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RESEARCH ON THE ECOLOGY OF SOME ANIMAL AND BIRD VIRUSES

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[Article by R. V. Belousova, P. M. Bokshcheyn, V. A. Zubov, Ye. S. Voronin, G. M. Usmanova, and V. I. Kis, Moscow Veterinary Academy]

[Text] Virus ecology is a new direction in infectious pathology of man and animals. The most important problem in this area is research on the unique mechanisms by which viruses persist and circulate in nature.

The principal task of this area is to reveal the range of viral diseases, the pathways by which disease agents are imported, the way they survive in nature in interepizootic and interepidemic periods, and the role of arthropods in maintaining a disease focus.

Complying with the requirements of the research program of the National Committee for Research on Viruses Ecologically Associated With Birds, in 1974-1976 we conducted a virological and serological survey of mammals and birds in the Amu Dar'ya flyway for presence of influenza virus, Newcastle disease virus, some agents responsible for calf pneumoenteritis, and antibodies to them with the goal of revealing the species of viruses circulating in this zone that are ecologically associated with wild birds and pathogenic to farm animals.

Materials and Methods

We examined a total of 2,543 farm animals (to include 1,577 cattle, 421 sheep, 10 goats, 133 horses, 53 camels, 35 asses, 15 pigs, and 299 hens) as well as 290 wild birds representing 43 species, and 28 wild mammals representing six species. We collected and studied 3,800 ticks and 2,500 mosquitoes.

Organs and washings from tracheal mucosa and cloaca of birds and of the nasal cavity of farm animals were preserved prior to study in liquid nitrogen, while blood serums were preserved with sodium azide and stored at 4°C.

Most of the wild birds we studied were in order Anseriformes, the dominant species being the red-headed teal (*Nettion erythrophys* Pall). Next in number were

gulls and sandpipers (mainly the lesser tern *Sterna albifrons* Pall, the silver gull *Larus argentatus* Pontopp, and the sea plover *Charadrius leucophaea* L.), as well as representatives of other taxonomic groups--Podicipedidae, Rallidae, Ardeidae, web-footed birds, and passerines.

Wild birds were shot over Muynakskiy Rayon, which borders directly on the Sea of Aral and is covered by a network of lakes affording all of the conditions for migratory feeding and subsequent nesting. At these lakes, there is constant contact between lake birds (mainly Anseriformes, long-legged waders, grebes, and so on) and birds in the shallow-water shore community (sandpipers, small passerines), which often visit the shores of lakes where animals graze. This is mainly an area of summer pastures for Karakalpak farms.

Viruses were isolated on 10-day chick embryo, newborn mice, and primary cell cultures (cow embryo kidneys, bull testicles, chick fibroblasts).

Blood serum was analyzed with 22 antigens obtained from inhibitor-resistant influenza virus strains, to include nine human, two pig, two horse, and nine avian antigens, with antigens against Newcastle disease, parainfluenza-3 (SP-4), cattle adenovirus (WBP-1), and viruses of the leukosarcomatose group (RSV-FAV-1), and with 15 arbovirus antigens (Sindbis, tick-borne, and Japanese encephalitis, Western Nile fever, Kyasanur forest disease, Crimean hemorrhagic fever, Powassan, Tahyna, Ukuniyemi, Issyk-Kul', Uz. 858, and others).

Antibodies to influenzavirus were revealed by subjecting serums to the hemagglutination inhibition test (HIT) and the WHO micromethod. Prior to the tests the serum samples were heated and processed with potassium periodate. Some of the serum samples that reacted positively to the HIT were subjected to the neuraminidase activity inhibition test (NAIT). The HIT was used on serum samples paired with antigens against Newcastle disease and parainfluenza-3 (PI-3) agent, the indirect hemagglutination test (IHT) was used on serums paired with adenovirus infection agent, Raus sarcoma agent was determined in the neutralization test (NT) on 11-day White Leghorn V-line chicks, and arboviruses were determined with the HIT and the CFT [complement-fixation test].

#### Research Results

A new arbovirus--Tandy--was isolated from *Hyalomma asiaticum asiaticum* ticks.

Presence of antibodies to the following antigens was established by analysis of cattle and sheep blood serums: Tahyna in 8-12.5 percent of the cases, Ukuniyemi in 1.5-2.5 percent, Issyk-Kul' in 1-1.5 percent, Uz. 858 in 2.5 percent.

Two strains of Crimean hemorrhagic fever virus were isolated from female *Hyalomma asiaticum asiaticum* ticks collected from cattle in one of the rayons of the Kara-Kalpak ASSR.

Antibodies to antigens of influenza virus A/duck/Ukraine/63, A/horse/Prague/56, and A/PR/34 were discovered in blood serum from farm animals in 1 percent of the cases in spring 1974, while antibodies to both human and animal influenza viruses were revealed in spring 1975 (Table 1). Antibodies to influenza virus were not detected in goats, wild mammals, and birds. The greatest percentages of antibodies to human influenza virus A/Port Chalmers/73 were revealed in hens--14.7 percent, asses--14.2 percent, came's--10 percent, goats--6.7 percent, horses--5.3 percent, and cattle--3.2 percent; antibodies to type B human influenza virus were revealed in goats--2.9 percent, and cattle--1.5 percent. Antibodies to subtype I equine influenza virus were detected in blood serum from camels, cattle, asses, and hens. Presence of antibodies to Newcastle disease virus was established in 8.2 percent of the cattle serum samples taken in two out of five rayons.

Table 1. Results of Analysis of Animal Serums Taken in 1975 in the Kara-Kalpak ASSR for Presence of Antibodies to Influenza and Newcastle Disease Viruses (Percent of the Number Analyzed)

(1) Антигены	(2) Крупный рогатый скот, 660 голов	(3) Лошади, 75 голов	(4) Ослы, 35 голов	(5) Верблюды, 70 голов	(6) Овцы, 103 голов	(7) Козы, 10 голов	(8) Куры, 69 голов	(9) Дикие птицы, 32 голов	(10) Дикие млекопитающие, 8 голов
(11) А/PR/8/34 (GON1)	0.15	0	0	0	0	0	0	0	0
А/PAH/52 (G1N1) (12)	0.3	0	0	0	0	0	0	0	0
(13) А/Сингапур/57 (G2N2)	0	0	0	0	0	0	0	0	0
А/Порт Чалмерс/73 (G3N2) (14)	3.2	5.3	14.2	10.0	6.7	0	14.7	0	0
(15) В/Ямагата/73	1.5	0	0	0	2.9	0	0	0	0
А/лошадь/Прага/56 (Geq1) (16)	5.0	0	2.8	10.0	0	0	3.0	0	0
(17) А/лошадь/Майами/63 (Geq2) (17)	6.77	0	2.8	0	0	0	0	0	0
А/свинья/Айова/30 (Tsw1) (18)	0	0	0	0	0	0	0	0	0
А/индейка/Канада/63 (Gav6) (19)	0	0	0	0	0	0	0	0	0
(20) А/утка/Украина/63 (Gav7) (20)	0.3	0	0	0	0	0	0	0	0
А/индейка/Онтарио/68 (Gav8) (21)	0	0	0	0	0	0	0	0	0
(22) Вирус ньюкаслской болезни	8.2	0	0	0	0	0	0	0	0

Key:

- |                          |                                    |
|--------------------------|------------------------------------|
| 1. Antigens              | 12. A/PAN/52 (G1N1)                |
| 2. Cattle, 660 head      | 13. A/Singapore/57 (G2N2)          |
| 3. Horses, 75 head       | 14. A/Port Chalmers/73 (G3N2)      |
| 4. Asses, 35 head        | 15. B/Yamagata/73                  |
| 5. Camels, 70 head       | 16. A/horse/Prague/65 (Geq1Neq2)   |
| 6. Sheep, 103 head       | 17. A/horse/Miami/63 (Geq2Neq2)    |
| 7. Goats, 10 head        | 18. A/pig/Iowa/30 (Tsw1N1)         |
| 8. Hens, 69 head         | 19. A/turkey/Canada/63 (Gav6Neq2)  |
| 9. Wild birds, 32 head   | 20. A/duck/Ukraine/63 (Gav7Neq2)   |
| 10. Wild mammals, 8 head | 21. A/turkey/Ontario/68 (Gav8N1t4) |
| 11. A/PR/8/34 (GON1)     | 22. Newcastle disease virus        |



Table 2. Antigen Detected in Animal Blood Serums (Percent) Sampled in the Kara-Kalpak ASSR in 1976

(1)  Вид животных	(2) Векна										Окень									
	групп (11)					(12)					(11) группа									
	(3) Исследовано проб	(4) A/TP/8/34	(5) B/Murata/73	(6) A/Синька/Алота/73	(7) A/Нид-Дмерен/73	(8) A/Индон/Онтарио/68	(9) Паратиф-3	(10) Аденовирус	(3) Исследовано проб	(4) A/TP/8/34	(13) A/Пан/52	(14) A/Токио/68	(15) П/Порт Чамел/73	(16) A/Викториа/75	(5) B/Murata/73	(7) A/Новый/Израиль/73	(8) A/FPV/Roslock/34	(9) A/Индон/Онтарио/68	(9) Паратиф-3	(10) Аденовирус
1) Крупный породный скот:	369	7,2	0	0	0	0	72,7	47,7	289	1,6	5,9	0	9,3	0,9	0	0	0	77,1	20,2	
2) До 2 лет	116	5,1	4,3	0,8	0	0	95,7	58,3	52	1,4	30,7	4,2	41,1	2,1	0	0	0	89,0	64,5	
3) Овцы	36	0	16,6	5,5	5,5	0	0	0	22	0	40,9	45,4	0	0	0	0	0	77,7	0	
4) Лошади	32	0	6,2	0	0	0	0	0	15	0	0	13,3	13,3	13,3	0	0	0	0	0	
5) Верблюды	41	0	0	0	0	0	0	0	50	0	0	26	26	26	0	0	0	0	0	
6) Свиньи	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7) Куры	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8) Другие млекопитающие	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Key:

1. Animal species
2. Spring
3. Number of samples
4. A/PR/8/34
5. B/Yamagata/73
6. A/pig/Iowa '30
7. A/New Jersey/76
8. A/Turkey/Ontario/68
9. Parainfluenza-3
10. Adenoviruses
11. Influenza
12. Fall
13. A/Pan/52
14. A/Hong Kong/68
15. P/Port Chalmers/73
16. A/Victoria/75
17. A/Horse/Prague/56
18. Cattle
19. Up to 2 years old
20. Over 3 years old
21. Sheep
22. Horses
23. Camels
24. Pigs
25. Hens
26. Wild animals

Table 3. Analysis Results for Serums Sampled From Wild Birds in the Kara-Kalpak ASSR in 1976

(1) Отряды птиц	(2) Печера						(10) Озеро					
	(3) исследовано	(4) грипп/А/НП/76	(5) ньюкастль	(6) паратиф	(7) аденовирус	(8) лезион						
	(3) исследовано	(4) грипп/А/НП/76	(5) ньюкастль	(6) паратиф	(7) аденовирус	(8) лезион	(11) озеро	(12) А/НП/76	(13) А/НП/76	(14) лезион	(15) лезион	(16) лезион
(14) Печера	2	0	0	1	0	2	0	0	0	2	0	0
(16) Веселые	2	0	0	0	0	2	0	0	0	0	0	0
(18) Печера	24	1	0	4	3	4	0	0	0	0	0	0
(20) Печера	2	0	0	0	0	0	0	0	0	0	0	0
(22) Печера	4	0	0	0	0	0	0	0	0	0	0	0
(23) Печера	1	0	0	0	0	1	0	0	0	1	0	0

Key:

1. Bird taxonomic groups
2. Spring
3. Number of samples analyzed
4. Influenza/A/PR/8/34
5. Newcastle disease
6. Parainfluenza-3
7. Adenoviruses
8. Leukosis
9. Positive serums
10. Fall
11. Influenza
12. A/pig/Iowa/30
13. A/New Jersey/76
14. Grebes
15. Web-footed birds
16. Waders
17. Anseriformes
18. Rallidae
19. Sandpipers
20. Gulls
21. Pigeons
22. Passerines
23. Predators

Serums reacting positively in the HIT were studied in the neuraminidase activity inhibition test (NAIT). Antineuraminidase antibodies were revealed in cattle, sheep, and horses against the following strains: A/horse/Prague/56, A/FM/1/47, and A/Port Chalmers/73, the titers being 1:20 - 1:60.

Tables 2 and 3 compare the results of tests run on blood serums sampled from different mammals and migratory birds in spring and fall 1976.

In May 1976 we found farm animal serums to contain antibodies against two types of human influenza viruses (A/PR/8/34 and B/Yamagata/73) and swine influenza (A/pig/Iowa/30 and A/New Jersey/76) in insignificant titers--1:20 - 1:40; antibodies in wild birds were active only against human virus (A/PR/8/34). In November-December, meanwhile, we revealed a significant number of seropositive animals among the animals examined (mature cattle--41.1 percent; horses--45.4 percent; pigs--13.3 percent; hens--26 percent) in relation to epidemic influenza strains (A/Hong Kong/68, A/Port Chalmers/73, A/Victoria/75) in titers of 1:80 - 1:640. Antibodies were revealed in wild birds (in 2.5 percent of the serums) only against swine influenza virus at a titer of 1:20.

Presence of antibodies against PI-3 virus was established in 90.7 percent of the cases (from 1:40 to 1:640) and against adenovirus in 64.5 percent of the cases (from 1:10 to 1:320) among mature cattle in both spring and fall. Presence of antibodies to PI-3 virus was established among sheep in an insignificant percentage of the cases--9.4 in spring and 7.7 in fall. Antibodies to PI-3 virus were detected in hen blood serum in 62 percent of the cases, while adenovirus antibodies were detected in 2 percent of the cases (from 1:10 to 1:40).

It should be noted that adenovirus antibodies were present in a significant titer--1:80--among wild mammals (the Tamariskiy gerbil).

Antibodies to PI-3 virus and adenovirus were established among wild birds in 43.5 and 25.6 percent of the cases respectively, most frequently among Anseriformes (mallards, teals, pochards, etc.), waders (rusty and gray herons), and pigeons.

Antibodies to Newcastle disease virus were revealed in 28.2 percent of serum samples taken from wild birds (mallards, gray ducks, rock pigeons, crows) only in fall.

Among representatives of 10 taxonomic groups of wild birds, antibodies to leukosarcomatose group viruses were established among web-footed birds (great cormorants), waders (rusty heron), Rallidae (coots), gulls (silver gull, river terns), and Anseriformes (mallards, gray ducks, and pochards). More positive serums were revealed in spring--62.5 percent, and less in fall--17.6 percent.

Virological analyses of the field material did not reveal cytopathic or hemagglutinating agents.

It can be hypothesized from the data obtained in 1974-1975 that agricultural animals play a certain role in circulation of some arboviruses in the natural communities of this zone. Evidence of this can be found in the positive results of serological tests, and in isolation of Crimean hemorrhagic fever viruses and the Tandy virus.

While in spring 1974 less than 1 percent of the farm animals in the investigated zone carried antibodies against influenza A viruses, significantly greater numbers were carriers in 1975 and 1976. Antibodies were discovered in 45 percent of them in fall 1976. Participation of wild birds and mammals in circulation of influenza viruses in this region turned out to be very insignificant. This was not the first time that antibodies against influenza virus of human origin were discovered in cattle, horses, camels, hens, and pigs; however, the laws governing incidence of these antibodies in relation to seasons of the year can reveal ecological features in circulation of human influenza viruses among farm animals.

The ecology of Newcastle disease virus is one of the least resolved and extremely important problems related to the epizootology of this infection. Detection of a number of strains of this virus in wild birds in the Volga Delta and on the Komandorskiy Islands and our discovery of these strains in blood serum from wild birds (up to 28.2 percent) and farm animals (up to 8 percent in cattle) are clear evidence that new, as yet unstudied pathways of circulation and survival of the disease agent in nature are present.

Discovery of antibodies against leukosarcomatose virus in wild birds (up to 62.5 percent in spring and up to 17.6 percent in fall) attests to their broad circulation among these representatives of the local fauna, which may be a source of infection of farm animals.

The high percentage of high-titer (up to 1:640) antibodies discovered against adenoviruses and PI-3 viruses in cattle indicates that some farms of this zone have a problem in relation to these infections. The role of wild birds and mammals in circulation and survival of a number of viruses--agents of calf pneumoenteritis (PI-3, adenoviruses, diarrhea, infectious rhinotracheitis, respiratory-syncytial virus, *Chlamydia*, rheolike viruses, and so on)--has not been studied yet for practical purposes. The occasional published reports concerning PI-3 and (IRT) viruses as well as the antibodies we discovered against PI-3 viruses and adenoviruses of various wild birds and gerbils (apparently noted for the first time) attest to the possibility that cattle viruses can circulate among representatives of the wild fauna.

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CONCENTRATION OF POLYKARBATSIN IN ORGANS AND TISSUES OF HENS SUBJECTED TO ACUTE INTOXICATION

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[Article by N. I. Zhavoronkov, S. D. Antsiferov, and S. M. Yevdokimov, All-Union Institute of Experimental Veterinary Science]

[Text] Polikarbatsin (poluram, metiram, Niagara 9102) is a complex preparation consisting of zinc polyethylenethiuramdisulfide and zinc polyethylene-bis-dithiocarbamate at a 1:3 ratio, with a zinc concentration of up to 21 percent. This is a light, solid light yellow substance that is insoluble in water and in most organic liquids, relatively soluble in weak aqueous alkaline solutions, and decomposes in the presence of strong acids and alkali (N. N. Mel'nikov, 1968).

Polikarbatsin persists for more than 30 days in water and in neutral mediums; undergoing hydrolysis in water, it forms ethylenethiurammonosulfide, ethylenethiourea, and sulfur. It is moderately stable in atmospheric conditions, and its half life is from 8 to 25 days. It is produced as a 75-80 percent wettable powder. It is used against pests and diseases affecting vegetables, fruits, and berries at a dose of 1-4 kg/ha on field crops, and up to 14 kg/ha in orchards and vineyards.

According to V. S. Martson' (1971) polykarbatsin is not very toxic to rats--the LD<sub>50</sub> is 6,100 mg/kg. Its cumulative action is weakly expressed, and it has embryotoxic and teratogenic properties when administered repeatedly at a dose of 1/10 LD<sub>50</sub> (L. I. Medved', 1974).

Despite low toxicity and poorly pronounced cumulative properties, according to the data of a number authors polykarbatsin has embryotoxic and teratogenic action, and consequently it is potentially hazardous to homeothermic animals and man on entering animal feed or human food.

It would be important in connection with the above to know the extent of polykarbatsin's accumulation and its persistence in organs and tissues of food-producing animals exposed to the drug with the goal of determining the



time of safe slaughter of the animals for meat and the possibilities for using livestock food products.

In order to study these problems we conducted experiments on hens with 80 percent polykarbatsin administered internally to the bird in the form of and aqueous suspension, after which we determined the pesticide's concentration in organs and tissues different times after intoxication.

There were 30 White Russian hens 2 years old weighing 1.5-2 kg in the experiment; they were separated into six groups of five hens each. Birds in groups 1, 2, 3, 4, and 5 were given polykarbatsin at a dose close to the maximum tolerable dose ( $LD_{50}$ ), which was 6 gm/kg. Hens in group 6 served as the control.

Experimental hens were kept under clinical observation, and prior to slaughter blood was sampled from the axillary vein to permit determination of hemoglobin and sugar by the anthrone method, and of nucleic acids (DNA, RNA, and free nucleotides) by the method suggested by R. G. Tsanev and G. G. Markov (1960).

The clinical pattern of acute intoxication consisted of disturbance in functions of the central and autonomic nervous systems, manifested as sharp inhibition, disturbance of motor coordination, absence of appetite, diarrhea, labored breathing, and reduction of body weight and clutch size in the first 3 days, and cessation of egg laying 5 days after intoxication. The intoxication symptoms disappeared 8-10 days after administration of polykarbatsin.

The pathoanatomical changes exhibited by dying and slaughtered hens were typified by hemodynamic disturbances and lipid dystrophy of the liver and kidneys coupled with necrobiotic phenomena.

One hen from group 1 was killed 30 minutes and 1, 3, 4, and 6 hours after administration of polykarbatsin. Polykarbatsin residue was not revealed in the blood, liver, muscles, kidneys, and lungs of hens killed after 30 minutes and 1, 3, and 4 hours; polykarbatsin was detected in the liver (4 mg/kg) in the hen killed after 6 hours, with no pesticide being established in other parenchymatous organs, in blood, and in muscles.

Hens were slaughtered 1 day after polykarbatsin administration in group 2, 5 days after in group 3, 10 days after in group 4, and 15 days after in group 5. The slaughtered hens were dissected and subjected to pathoanatomical analysis; organ and tissue samples were taken to determine their polykarbatsin concentration by the carbon disulfide method (M. Sh. Vekshteyn, 1967). The sensitivity of the method is 20  $\mu$ g per sample.

Chemical analysis of organs and tissues from slaughtered hens in group 2 1 day after intoxication revealed pesticide in the liver--230 mg/kg, in the lungs--170 mg/kg, and in the wall of the stomach--160 mg/kg. Significantly less pesticide accumulated in the muscles, ovaries, and oviducts (50-55 mg/kg).

One day following internal administration of polykarbatsin the hemoglobin concentration in hen blood increased by 11.7 percent ( $P > 0.05$ ), sugar increased by 30 percent ( $P < 0.01$ ), the quantity of RNA in blood dropped by 24 percent ( $P < 0.01$ ), and DNA increased by 23.5 percent ( $P < 0.01$ ). Acid-soluble nucleotides were within the range of control indices.

Five days after intoxication the blood sugar concentration of hens in group 3 remained 39 percent above the control figures ( $P < 0.01$ ), DNA remained 5 percent higher ( $P < 0.01$ ), and RNA was 26 percent lower ( $P < 0.01$ ); the quantity of acid-soluble nucleotides increased by 29 percent ( $P < 0.01$ ).

The livers of hens in group 3 slaughtered 5 days after intoxication contained 100 mg/kg polykarbatsin; other concentrations detected were 90 mg/kg in the stomach, 40 mg/kg in its wall, 60 mg/kg in the lungs, and 15 mg/kg in muscles.

Ten days after intoxication the overall condition of the hens and the hemoglobin characteristics did not differ significantly from control. The DNA level increased by 60 percent, RNA increased by 18 percent, and the quantity of acid-soluble nucleotides dropped by 60.4 percent.

Chemical analysis of organs and tissues from hens slaughtered after 10 days revealed polykarbatsin residues in the liver (18.5 mg/kg) and in skeletal muscles (2 mg/kg). Pesticide residues were not detected in the stomach wall, in its contents, and in blood.

Polykarbatsin was not detected in organs and tissues of hens in group 5 slaughtered 15 days after intoxication. However, feces continued to contain residues for 28-30 days. The concentration of hemoglobin and sugar in the blood of these hens was on par with control figures. The concentration of nucleic acids remained the same as in hens slaughtered 10 days after intoxication.

The highest polykarbatsin concentration in hens slaughtered 1-5 days after acute intoxication was found in blood, liver, kidneys, lungs, stomach wall, and feces.

The pesticide was eliminated mainly with feces and eggs. It was established in this case that after 15 days the pesticide could not be detected in organs and tissues by the techniques employed; however, it continued to be detected for up to 28-30 days in feces.

It should be noted that acute polykarbatsin intoxication cause noticeable breakdown of nucleic acids and inhibition of their synthesis in the hen body.

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2,4-D BUTYLETHER CONCENTRATION IN THE ANIMAL BODY

Moscow VETERINARIYA in Russian No 4, 1979 pp 66-67

[Article by G. A. Talanov, All-Union Scientific Research Institute of Veterinary Medicine, and A. T. Ivanov and D. A. Giris, Belorussian SSR Scientific Research Institute of Experimental Veterinary Science]

[Text] Agriculture makes broad use of 2,4-D herbicides, but their accumulation, distribution, and elimination from the bodies of animals have not been studied sufficiently, and the existing published data are contradictory.

Inasmuch as traces of 2,4-D are not permitted in food products, if we are to keep food products safe from the hygienic point of view we would have to acquire data on the time of complete elimination of these herbicides from the animal body.

We studied accumulation of 2,4-D butylether in the animal body and its elimination from it. The concentration of the preparation in blood, organs, and tissues was determined by gas-liquid chromatography.

2,4-D Butylether was given once internally at doses of 1,000, 710, and 400 mg/kg body weight to 15 calves weighing 250 kg, while three cows were given a dose of 100 mg/kg body weight. A dose of 1,000 mg/kg body weight elicited intoxication 1.5-2 hours after administration, expressing itself most clearly on the 2nd day by inhibition, disturbance in motor coordination, paresis, loss of tactile and superficial pain sensitivity around the croup and on pelvic limbs, low body temperature, bradycardia, arrhythmia, atonia of the rumen, and complete or partial rejection of feed.

Tactile and superficial pain sensitivity disappeared gradually, beginning with portions of the pelvic limbs and the croup. Sensitivity survived over other portions of the animal body. The myotonic syndrome, which is the main distinguishing sign of 2,4-D intoxication in intoxicated laboratory animals, did not manifest itself in the cattle.

Five and 12 days after administration of the preparation at a dose of 1,000 mg/kg body weight two of the animals died; the clinical signs of intoxication disappeared from three animals on the 8th and 9th days.

Pathoanatomical changes included stagnant hyperemia of internal organs, swelling and hyperemia coupled with hemorrhaging in the submaxillary, pre-scapular, patellar, mediastinal, portal, and mesenteric lymph nodes and in the mucous membrane of the gastrointestinal tract, and multiple point hemorrhaging beneath the endo- and epicardium and in the renal capsule.

The clinical pattern of intoxication was the same but less strongly pronounced for animals given a preparation dose of 710 mg/kg body weight. All experimental animals survived, and they appeared clinically healthy on the 4th-6th days.

When administered once to calves at a dose of 400 mg/kg body weight, 2,4-D butylether elicited weakly pronounced clinical signs of intoxication, which disappeared on the 3rd-4th days. Clinical signs of intoxication were not noted in cows given a dose of 100 mg/kg body weight.

We established that the concentration of the preparation in blood increases during the day, and that it correlates with the dose of the herbicide introduced and with the severity and duration of the clinical pattern of intoxication.

The highest herbicide concentration was detected 24 hours after one-time administrations of the preparation at doses of 1,000, 710, and 400 mg/kg body weight, and 12 hours after one-time administration at a dose of 100 mg/kg body weight. The lower the 2,4-D dose, the more quickly the preparation disappeared from the blood. Residues of the preparation were not detected in blood 21 days after administration of the herbicide at doses of 1,000 and 710 mg/kg body weight, 9 days after a dose of 400 mg/kg, and 5 days after a dose of 100 mg/kg.

The half-life of 2,4-D butylether in the animal body was computed by the formula suggested by P. H. Dost:

[Formula illegible]

where  $t_1$  and  $t_2$  are sampling times after administration, and  $U_1$  and  $U_2$  are the concentrations of the substance in blood.

The time required for half of the herbicide to be eliminated from blood following internal administration at a dose of 100 mg/kg was 9.9 hours; this half-life was 17.8 hours for a dose of 400 mg/kg, 25.8 hours for 710 mg/kg, and 43.7 hours for 1,000 mg/kg.

We determined the time of complete elimination of herbicide residues from the half body on the basis of its level in muscles and internal organs of bull calves weighing 250 kg, slaughtered 15, 20, 30, and 45 days after one-time internal administration of the preparation at a dose of 900 mg/kg body weight.

Following one-time administration of 2,4-D butylether to calves at a dose of 900 mg/kg body weight, preparation residues were no longer detected in muscles, in pararenal fat, and in the heart after 15 days, in lungs after 20 days, and in liver and kidneys after 30 days.

We believe that the period of maximum development of clinical intoxication symptoms coincides with the highest level of herbicide residues in blood. Therefore when it is suspected that animals have been intoxicated by herbicides in the 2,4-D group, it would be suitable to take blood samples from animals displaying clinical intoxication symptoms and send them out for residue analysis. Detection of the herbicide in blood would confirm the diagnosis.

We believe that cattle surviving intoxication by herbicides in the 2,4-D group may be slaughtered for meat not less than 30 days after intoxication.

2,4-D Herbicide residues were given to calves for 3 months with feed at doses of 8.2 and 0.5 mg/kg body weight or 74.0, 18.5, and 4.6 mg/kg feed in order to establish the level of accumulation of 2,4-D herbicide residues in organs and tissues of animals taking up the preparation with feed over a long period of time. We determined the herbicide's concentration in pararenal fat, muscles, liver, and kidneys.

Residues were not detected in the muscles and fat of animals given the preparation with feed for 3 months at a dose of 0.5 mg/kg body weight; it was detected in kidneys 5 days after administration was terminated, and in liver 10 days after termination.

Residues of the preparation were established in muscles and kidneys 10 days after administration of the herbicide at a dose of 2 mg/kg body weight, and in liver and fat 15 days after its administration.

When 2,4-D butylether was fed to animals for 3 months at a dose of 8 mg/kg body weight, its residues were revealed in muscles 10 days after termination of feeding, in fat 15 days after, and in liver and kidneys 30 days after.

Following 3 months of administration of the herbicide with feed, the quantities of residues detected in meat and internal organs of the calves were a dozen times lower than daily intake of the preparation by the animal body, which indicates that the preparation does not accumulate in the body. At the same time, herbicide residues were detected in internal organs more than 30 days after termination of the preparation's administration. In this case we suggest that the preparation binds with endogenous metabolites capable of circulating in the animal body for a long period of time.

#### Conclusion

Animals surviving intoxication by 2,4-D butylether and exhibiting a pronounced clinical pattern may be slaughtered not less than 15 days after intoxication,



and all internal organs can be used only for industrial purposes. When such animal are slaughtered 30 days after intoxication, the carcass and other products may be released without restrictions.

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YOUNG ANIMAL DISEASE, BIRD DISEASE, AND COW INFERTILITY CONFERENCES HELD

Moscow VETERINARIYA in Russian No 4, 1979 pp 81-83

[Articles by M. V. Yakubovskiy and A. F. Piluy, N. Kireyev, and K. S. Kapanadze]

[Text]

Minsk, N. V. Yakubovskiy and A. F. Piluy

Participants of the republic scientific-production conference on the topic "Measures for Preventing and Controlling Diseases of Young Agricultural Animals in Industrial Complexes" included Belorussian SSR Communist Party Central Committee Agricultural Division Deputy Director Ye. I. Sorokin, Belorussian SSR Deputy Minister of Agriculture F. V. Mirochitskiy, and scientists and practical specialists of the Belorussian SSR, RSFSR, Ukrainian SSR, Lithuanian SSR, Latvian SSR, and Estonian SSR.

N. N. Shvydkov, chief of the Belorussian SSR Ministry of Agriculture Main Veterinary Administration, gave the report "Measures for Controlling Diseases of Young Agricultural Animals in the Republic." Among the causes of disease and mortality of young animals, he laid emphasis on violation of animal feeding and maintenance conditions, and presence of infectious diseases. Shvydkov turned special attention to improving the techniques of reproducing, feeding, and maintaining the animals, and to making qualitative improvements in the work of all levels of the veterinary service when organizing therapeutic-preventive and organizational-administrative measures.

Neonatal calf diseases cause significant economic harm to animal husbandry, for which reason development and improvement of methods for controlling these diseases has important scientific and practical significance. The speaker singled out dyspepsia among noncontagious diseases of newborn animals, and calf colibacteriosis among contagious diseases. These diseases can be prevented by working toward acquisition of morphologically and functionally mature offspring. Complete balanced feeding of pregnant cows and their optimum maintenance play the main role here.

The most effective preparations for controlling these cattle diseases are polyorgan tissue extracts for cows and cattle glucosocitrated blood,

administered intraperitoneally. It was also established that giving highly productive cows rations having a sugar-protein ratio of 0.9-1.1 leads to birth of weak calves. At the same time cow rations having a sugar-protein ratio of 1.5:1 resulted in healthy calves exhibiting high natural resistance.

Doctors of veterinary sciences M. I. Nemchenko ((VNIINBZh)), V. A. Alikayev (Moscow Veterinary Academy), and M. P. Koval' (Grodno Agricultural Institute), Associate Professor A. I. Chernyshev (Kazan' Veterinary Institute), Candidate of Veterinary Sciences S. M. Suleymanov (VNIINBZh), and others noted the important role new techniques for maintaining young animals play in prevention of gastrointestinal diseases of newborn calves.

It was pointed out in reports by candidates of veterinary sciences V. S. Azarenko and V. I. Korol'kov (BelNIIEV [Belorussian SSR Scientific Research Institute of Experimental Veterinary Science]), by doctors of veterinary sciences V. V. Tilga and M. Teder (Estonian SSR Scientific Research Institute of Animal Husbandry), and others that the agents of respiratory diseases of calves maintained at complexes and large farms where the conditions for maintaining young animals are violated include adenoviruses, *Chlamydia*, and many species of microbes--*Pasturella*, *Escherichia*, *Staphylococcus*, *Salmonella*, *Streptococcus*, and others.

Because respiratory diseases developing in animals are characterized by many different etiologies, it would be best to treat these diseases by prolonged use of antibiotics in the tetracycline group--dibiomitsin and ditetracycline. When these preparations are administered perorally at a dose of 50,000 units/kg body weight, they maintain a therapeutic concentration in blood serum for 3 days, while at a dose of 80,000 units/kg the therapeutic concentration persists up to 5 days.

Antibiotics mixed with sulfamilamide preparations and general tonic agents are most effective in the treatment of calves stricken with bronchopneumonia.

The natural resistance level of piglets maintained at complexes is significantly lower than that of animals grown at conventional farms following the old traditional procedures. Use of adaptogenic preparations--eleuterokokk, vitamin B<sub>12</sub>, and others--during times of stress and following them is suggested as a means for raising natural resistance.

Natural resistance is raised in piglets by complex immunization of farm animals against plague, erysipelas, and Aujeszky's disease, with pharmacological preparations--dibasol and methyluracil, and biological agents--heterogenic blood, thioglobulin, prodigiosin, and others.

Because noninfectious diseases are the most frequent causes of mortality in large pig raising complexes (hypotrophy and dyspepsia in sucking piglets, catarrhal and catarrhal-hemorrhagic gastroenteritis and bronchopneumonia in the period of final growth), antistress preparations must be introduced into the gastrointestinal disease treatment and prevention program.

Doctors of veterinary sciences A. I. Federov and I. M. Karput', candidates of veterinary sciences V. A. Telepnev, L. B. Dvorkin and N. D. Birkan (Vitebsk Veterinary Institute), V. S. Buzlama (VNIINEZh), A. Ye. Ispenkov, V. I. Gevedze, D. P. Ivanov, and S. S. Lipnitskiy (BelNIIEV), and others suggested one-time administration of ferrodextran at an age of 3 days as a means for preventing anemia in piglets. Then the animals are given a feed additive containing iron, copper, cobalt, zinc, and manganese compounds as well as binding agents and flavorings.

Doctors of biological sciences E. K. Val'dman and V. V. Tilga, Candidate of Biological Sciences P. I. Margus (Estonian SSR Scientific Research Institute of Animal Husbandry and Veterinary Science), Doctor of Veterinary Sciences V. A. Len'kova (BelNIIEV), graduate student A. A. Gutkovskiy (Belorussian SSR Republic Veterinary Laboratory), and others laid emphasis on prevention of diseases in young animals through the use of immunopreventive agents--gamma-globulin and colivaccine from local strains, thioglobulin, concentrated (GOA) vaccine, and others. In order that vaccine providing good protection against colibacteriosis could be acquired, the immunogenicity of each strain must be studied.

Reports presented at the conference by E. Valionis (Lithuanian SSR Ministry of Agriculture), M. B. Bakumenko (Ukrainian SSR Scientific Research Institute of Experimental Veterinary Science), A. G. Shakhova (VNIINEZh), and others focused attention on the aerosol method for preventing and treating calf bronchopneumonia using SAG-1 and DAG-2 generators. These generators make it easier to use the therapeutic mixture, which consists of antibiotics, ammonium chloride, glycerin, novocaine solution, and distilled water.

Cattle respiratory and gastrointestinal diseases can be prevented and treated by aerosol spraying of nonspecific globulin. This method is more effective in comparison with intramuscular injection, and consumption of the bio-preparation is twice lower.

Ammonium iodide and chloramine-B can be used successfully as aerosols to treat bronchopneumonia in piglets; these drugs improve the overall condition of the animals and reduce bacterial contamination of air in buildings. When animals were processed by these preparations at the studied concentrations for the stated number of times, pathological changes did not occur in the bodies of piglets.

The profitability of many livestock complexes depends in many ways on the supply of nutritionally complete, guaranteed quality combined feeds; thus it has now become necessary to create veterinary laboratories to monitor animal metabolism and the quality of combined feeds.

These and many other organizational problems were discussed in reports by Candidate of Veterinary Sciences, Gomel'skaya Oblast Executive Committee Veterinary Division Chief S. G. Balashenko, Belorussian SSR Livestock

Industry Chief Veterinarian V. N. Kapustin, Candidate of Agricultural Sciences, Borisovskiy Sovkhoz-Combine Senior Process Engineer O. T. Sidorenko, Mir Complex (Belorussian SSR) Chief Veterinarian I. I. Mikulich, and others.

The conference participants discussed recommendations based on the conference proceedings and adopted a resolution.

Pyatigorsk, N. Kireyev

Courses on preventing and diagnosing bird diseases were conducted on the initiative of the RSFSR Ministry of Agriculture Main Veterinary Administration and the Pyatigorsk Interoblast Veterinary Laboratory of Bird Disease Control for specialists in farms, poultry trusts, and veterinary laboratories in 18 krais, oblasts, and autonomous republics of the RSFSR.

Candidate of Veterinary Sciences M. Ye. Mamonov, director of the Pyatigorsk Interoblast Veterinary Laboratory, noted in his introductory remarks that intensification of poultry raising is posing new problems to veterinary science and practice concerned with developing and introducing effective measure for early diagnosis, prevention and control of bird diseases of infectious and noncontagious etiology.

L. A. Yudina, senior veterinarian of the RSFSR Ministry of Agriculture Main Veterinary Administration Antiepidemiologic Division, gave the report "Development of Poultry Raising on an Industrial Basis, and the Tasks of Specialists Concerned With Preventing Acutely Infectious Bird Diseases." She pointed out that despite improvements in the epizootic situation in the RSFSR in relation to a large number of infectious and invasive bird diseases, poultry farms are continuing to experience significant losses due to false plague, pasteurellosis, pullorosis-typhus, colibacteriosis, coccidiosis, and diseases of uncontagious etiology. L. A. Yudina noted that veterinary practice needs dependable, quick methods for diagnosing acutely contagious bird diseases, mainly Newcastle disease, influenza, (ILT), infectious bronchitis and others.

USSR Poultry Industry Deputy Chief Z. V. Fokina dwelled in her report on the prospects for development of poultry raising. USSR Poultry Industry Veterinary Division Chief A. I. Malygin acquainted the audience with the epizootic situation at poultry raising farms. He turned attention to the need for treating the breeding poultry farms for pullorosis-typhus and other diseases elicited by conditionally pathogenic microflora.

Colleagues of the All-Union Veterinary Scientific Research Institute of Poultry Raising, the Stravropol' Agricultural Institute, and the (VGNKI) gave lectures at the courses.

Assistant Professor Yu. I. Stryukov (Stravropol' Agricultural Institute) devoted his lecture to the value of nutritionally complete rations in the



prevention of bird diseases and improvement of bird productivity. Prof A. B. Teryukhanov (VNIVIP)) gave a report on prevention of Newcastle disease and infectious bronchitis in birds, as well as on ways to control and prevent these diseases.

Reports by candidates of veterinary sciences from this institute turned the attention of the audience to the following topics: Methods for preventing and controlling avian pasteurellosis (A. N. Borisenkova); diagnosis and prevention of duck viral hepatitis and infectious avian laryngotracheitis (V. V. Malushko); ways for controlling and preventing coccidiosis in young birds (A. I. Kirillov); epizootology, immunology, and prevention of Marek's disease (Yu. V. Solov'yev) and of avian respiratory mycoplasmosis (O. V. Vinokhodov).

Candidate of Veterinary Sciences Yu. Ye. Kreymer (VGNKI) discussed the problems of immunodiagnosis and specific prevention of Newcastle disease, and Candidate of Veterinary Sciences N. A. Kireyev (Pyatigorsk Interblast Veterinary Laboratory) discussed the principal directions in prevention and control of turkey histomoniasis and trichomoniasis.

V. I. Logunov (Brattsevsckoye Industrial Poultry Raising Association), I. S. Dubrov (senior veterinarian, Krasnodar Ptitseprom Trust), and N. V. Shkarin (Kotlyavskiy State Industrial Poultry Raising Plant) shared their work experience at the courses.

The course participants viewed popular scientific films on poultry raising.

Tbilisi, K. S. Kapanadze

In October 1978 the Georgian SSR Zooveterinary Scientific Research Institute and the Georgian SSR Livestock Industry Administration sponsored a theoretical conference devoted to prevention of infertility in cows. Veterinary specialists and scientists took part in its proceedings.

Assistant Professor K. G. Kartvelishvili, the institute's prorector, gave the introductory remarks. Assistant Professor K. F. Gugushvili, chairman of the Department of Obstetrics and Gynecology, used concrete examples to describe what was being done to prevent cow infertility at the republic's farms. He analyzed the causes of the low calf yield and pointed out the ways for eliminating them.

The scientists and specialists showed interest in reports by Prof V. P. Shamataev on controlling cattle brucellosis; by artificial insemination division chief Ye. L. Khachapuridze on the significance of artificial insemination to control of infertility; by Assistant Professor V. G. Dzhikiy on the gynecological, infectious, and invasive diseases and the ways for controlling them; by Assistant Professor A. S. Bibileshvili on methods for determining pregnancy in cows and diagnosing gynecological diseases; by Assistant Professor R. D. Chanturidze on the immunological factors of cow infertility.

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## VETERINARY MEDICINE

IZDATEL'STVO KOLOS ANNOUNCES NEW VETERINARY BOOKS IN FIRST QUARTER OF 1979

Moscow VETERINARIYA in Russian No 4, 1979 p 97

### [Article]

[Text] Polyakov, A. A., "Veterinarnaya sanitariya" (Veterinary Medicine), 75 kopecks.

This book contains information on the system of hygienic measures and disinfection employed at livestock complexes and other farms, rodent control measures, and the hygiene of milk acquisition at farms. Problems concerning veterinary sanitation at meat and poultry processing enterprises and slaughtering points, and decontamination of transportation resources, soil, manure, and water are illuminated.

The book is intended as a training aid for veterinary institute and school students.

Ginzburg, A. G., "Organizatsiya i planirovaniye veterinarnogo dela" (Organization and Planning of Veterinary Affairs), 35 kopecks

This book describes the organizational foundations and structure of the veterinary service, and its tasks. It presents the responsibilities of assistant veterinarians in kolkhozes, sovkhoses, livestock complexes, poultry factories, and the state veterinary network. The most important requirements imposed today by veterinary legislation on protection of farms against infectious animal diseases are examined.

The book is intended as a training aid for students of secondary agricultural educational institutions.

Kozlo, N. Ye, and Legoshin, G. P., "Organizatsiya i tekhnika vosпроизводства sel'skokhozyaystvennykh zhivotnykh" (Organization and Techniques of Agricultural Animal Reproduction), 30 kopecks

This training aid, intended for students of secondary educational institutions with a zootechnology major, presents the genetic fundamentals of selection

in animal husbandry. It discusses the ways that maternal stock is utilized and how producers are secured for the herd for artificial insemination. The unique features of judging animals in meat cattle raising, pig raising, and sheep raising are described. Problems concerning breeding, feeding, and maintaining animals as well as organizing the work of artificial insemination stations and points are illuminated.

Yarnykh, V. S., and Simetskiy, M. A., "Veterinarnyye preparaty v aerol'nykh ballonakh" (Veterinary Preparations in Aerosol Tanks), 35 kopecks

This book provides a brief historical sketch of preparations in aerosol tanks, and it describes the principle of operation, design, and fundamentals of the production of aerosol tanks. It provides recipes for fillers used in veterinary medicine for preventive and therapeutic purposes, for disinfection, and for control of ticks and insects parasitizing animals. The economic effectiveness of veterinary measures calling for use of preparations in aerosol containers is evaluated.

Nikol'skiy, S. N., and Vodyanov, A. A., "Psoroptozy ovets i krupnogo rogatogo skota" (Sheep and Cattle Psoroptic Disease), a bibliography for the practical veterinarian, 30 kopecks

This book describes methods for controlling psoroptic diseases in the Northern Caucasus with a consideration for new scientific data and the achievements of veterinary practice. It describes the disease agents and indicates the causes promoting spread of disease, its clinical signs, and the diagnostic methods. It illuminates the methods for preventing disease and treating sick animals.

Berestov, V. A., et al., "Primereniye belkovykh gidralizatorov v veterinarii" (Use of Protein Hydrolyzers in Veterinary Medicine), translated from Bulgarian, 80 kopecks

Bulgarian and Soviet scientists examine the nutritional, stimulatory, detoxificational, and plasma-substituting properties and mechanism of action of protein hydrolyzers (L-103 hydrolysin, aminopeptidase, gidroprot, and others), and their influence on the animal body in normal conditions and in pathology.

Varli, Dzh. K., Graduelli, Dzh. R., and Khassell, M. P., "Ekologiya populyatsii nasekomykh (analiticheskii podkhod)" (Ecology of Insect Populations (an Analytical Approach)), translated from English, price 1 ruble 10 kopecks

This monograph presents methods for quantitative assessment of experimental data on the dynamics of harmful insect populations, as well as the principles of interaction of pest populations and their parasites and predators. The principles and methods of statistical and mathematical treatment of research results are examined.

Books may be acquired in book stores of Knigotorg or Potrebkooperatsia. The publishing house and the editorial board do not accept orders.

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